Brain Computer Interface

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***Abstract*—Brain-computer interface (BCI) is a fast-growing emergent technology, in which researchers aim to build a direct channel between the human brain and the computer.The device was designed to help those who have lost control on their limbs, or other bodily functions, such as patients with amyotrophic lateral sclerosis (ALS) or spinal cord injury A Brain Computer Interface (BCI) is a collaboration in which a brain accepts and controls a mechanical device as a natural part of its representation of the body. Computer-brain interfaces are designed to restore sensory function, transmit sensory information to the brain, or stimulate the brain through artificially generated electrical signals.A brain-computer interface is a new communication link between a functioning human brain and the outside world. BCI uses brain activity to command, control, actuate and communicate with the world directly through brain integration with peripheral devices and systems. The signals from the brain are taken to the computer via the implants for data entry without any direct brain intervention. BCI transforms mental decisions and/or reactions into control signals by analysing the bioelectrical brain activity.**

Keywords—**BCI, Bioelectrical Brain activity, ALS.**

I. INTRODUCTION

Brain Gate is a brain implant system developed by the bio-tech company Cyberkinetics in 2003 in conjunction with the Department of Neuroscience at Brown University. The device was designed to help those who have lost control on their limbs, or other bodily functions, such as patients with amyotrophic lateral sclerosis (ALS) or spinal cord injury.The possibility of establishing a direct communication and control channel between the human brain and computers or robots has been a topic of scientific speculation and even science fiction for many years. Over the past twenty years, this idea has been brought to fruition by numerous research and development programs, and has evolved into one of the fastest-growing areas of scientific research. This technology, called brain-computer interface (BCI) technology, provides a new output channel for brain signals to communicate or control external devices without using the normal output pathways of peripheral nerves and muscles. A BCI recognizes the intent of the user through the electrophysiological or other signals of the brain. Electrophysiological signals may be recorded over the scalp, underneath the scalp, or within the brain; other types of physiological signals may be recorded by magnetic sensors or other means. In real time, a brain signal is translated into output commands that accomplish the desire of the user. The most common example of use of such technology is the direct control of a computer cursor by a person or animal using a BCI based on electrophysiological signals.

A BCI allows a person to communicate with or control the external world without using conventional neuromuscular pathways. That is, messages and control commands are delivered not by muscular contractions but rather by brain signals themselves. This BCI feature brings hope to individuals who are suffering from the most severe motor disabilities, including people with amyotrophic lateral sclerosis (ALS), spinal cord injury, stroke, and other serious neuromuscular diseases or injuries. BCI technology holds promise to be particularly helpful to people who are "locked-in," cognitively intact but without useful muscle function. Restoration of basic communication capabilities for these people would significantly improve their quality of life as well as that of their caregivers, increase independence, reduce social isolation, and potentially reduce cost of care.

BCI research has undergone an explosive growth in recent years. At present, there are over 400 groups worldwide engaging in a wide spectrum of research and development programs, using a variety of brain signals, signal features, and analysis and translational algorithms. In this review, we discuss the current status and future prospects of BCI technology and its clinical applications.

II. METHODOLOGY

A. *The Human Brain*

All of it happens in the brain. The brain is undoubtly the most complex organ found among the carbon-based life forms. So complex it is that we have only vague information about how it works. The average human brain weights around 1400 grams. The most relevant part of brain concerning BCI's is the cerebral cortex. The cerebral cortex can be divided into two hemispheres. The hemispheres are connected with each other via corpus callosum. Each hemisphere can be divided into four lobes. They are called frontal, parietal, occipital and temporal lobes.

Cerebral cortex is responsible for many higher order functions like problem solving, language comprehension

and processing of complex visual information. The cerebral cortex can be divided into several areas, which are responsible of different functions. This kind of knowledge has been used when with BCI's based on the pattern recognition approach. The mental tasks are chosen in such a way that they activate different parts of the cerebral cortex.

Cortical Area	**Function**
Auditory Association Area	Processing of auditory information
Auditory Cortex	Detection of sound quality (loudness, tone)
Speech Center (Broca's area)	Speech production and articulation
Prefrontal Cortex	Problem solving, emotion, complex thought
Motor Association Cortex	Coordination of complex movement
Primary Motor Cortex	Initiation of voluntary movement
Primary Somatosensory Cortex	Receives tactile information from the body
Sensory Association Area	Processing of multisensory information
Visual Association Area	Complex processing of visual information
Wernicke's Area	Language comprehension

Table1: Cortical areas of the Brain and their function

A. Main Principle

Main principle behind this interface is the bioelectrical activity of nerves and muscles. It is now well established that the human body, which is composed of living tissues, can be considered as a power station generating multiple electrical signals with two internal sources, namely muscles and nerves. We know that brain is the most important part of human body. It controls all the emotions and functions of the human body. The brain is composed of millions of neurons. These neurons work together in complex logic and produce thought and signals that control our bodies. When the neuron fires, or activates, there is a voltage change across the cell, (~100mv) which can be read through a variety of devices. When we want to make a voluntary action, the command generates from the frontal lobe. Signals are generated on the surface of the brain. These electric signals are different in magnitude and frequency. By monitoring and analysing these signals we can understand the working of brain. When we imagine ourselves doing something, small signals generate from different areas of the brain. These signals are not largeenough to travel down the spine and cause actual movement. These small signals are, however, measurable. A neuron depolarizes to generate an impulse; this action causes small changes in the electric field around the neuron. These changes are measured as 0 (no impulse) or 1 (impulse generated) by the electrodes. We can control the brain functions by artificially producing these signals and sending them to respective parts. This is through stimulation of that part of the brain, which is responsible for a particular function using implanted electrodes.

B. Electroencephalography

Electroencephalography (EEG) is a method used in measuring the electrical activity of the brain. The brain generates rhythmical potentials which originate in the individual neurons of the brain. These potentials get summated as millions of cell discharge synchronously and appear as a surface waveform, the recording of which is known as the electroencephalogram.

The neurons, like other cells of the body, are electrically polarized at rest. The interior of the neuron is at a potential of about –70mV relative to the exterior. When a neuron is exposed to a stimulus above a certain threshold, a nerve impulse, seen as a change in membrane potential, is generated which spreads in the cell resulting in the depolarization of the cell. Shortly afterwards, repolarization occurs.

The EEG signal can be picked up with electrodes either from scalp or directly from the cerebral cortex. As the neurons in our brain communicate with each other by firing electrical impulses, this creates an electric field which travels though the cortex, the dura, the skull and the scalp. The EEG is measured from the surface of the scalp by measuring potential difference between the actual measuring electrode and a reference electrode. The peak-to-peak amplitude of the waves that can be picked up from the scalp is normally 100 µV or less while that on the exposed brain, is about 1mV. The frequency varies greatly with different behavioural states. The normal EEG frequency content ranges from 0.5 to 50 Hz.

Frequency information is particularly significant since the basic frequency of the EEG range is classified into five bands for purposes of EEG analysis. These bands are called brain rhythms and are named after Greek letters.

Five brain rhythms are displayed in Table.2. Most of the brain research is concentrated in these channels and especially alpha and beta bands are important for BCI research.

Band	Frequency [Hz]
Delta	0.5- 4
Theta	4- 8
Alpha	8- 13
Beta	13- 22
Gamma	22-30

Table.2.Common EEG frequency ranges

The alpha rhythm is one of the principal components of the EEG and is an indicator of the state of alertness of the brain.

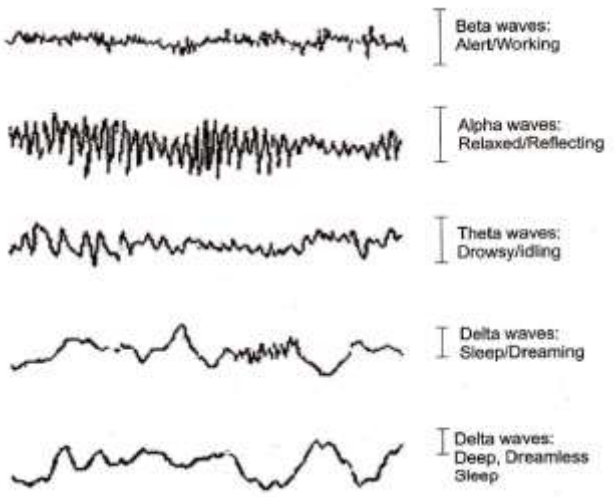

Figure (a): Examples of alpha, beta, theta and delta rhythms

C. BCI Approaches

What are the thoughts the user thinks in order to control a BCI? An ideal BCI could detect the user's wishes and commands directly. However, this is not possible with today's technology. Therefore, BCI researches have used the knowledge they have had of the human brain and the EEG in order to design a BCI. There are basically two different approaches that have been used. The first one called a pattern recognition approach is based on cognitive mental tasks. The second one called an operant conditioning approach is based on the self-regulation of the EEG response.

In the first approach the subject concentrates on a few mental tasks. Concentration on these mental tasks produces different EEG patterns. The BCI can then be trained to classify these patterns. In the second approach the user has to learn to self-regulate his or her EEG response, for example change the beta rhythm amplitude. Unlike in the pattern recognition approach, the BCI itself is not trained but it looks for particular changes (for example higher amplitude of a certain frequency) in the EEG signal. This requires usually a long training period, because the entire training load is on the user.

III. BLOCK DIAGRAM

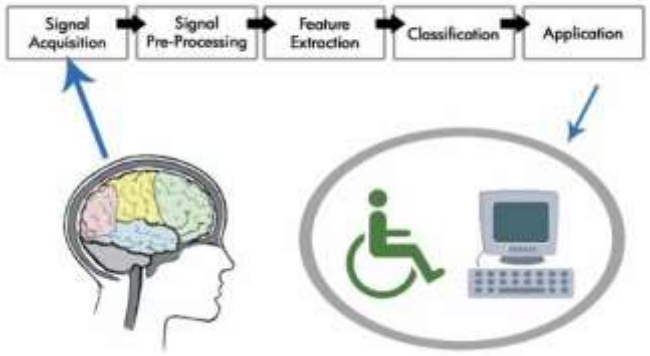

Figure (b): General Approach of BCI

Any BCI, regardless of its recording methods or applications, consists of four essential elements, as described by Wolpaw:

1. Signal acquisition
2. Feature extraction
3. Feature translations
4. Device output

1 .Signal Acquisition

Signal acquisition is the measurement of the neurophysiologic state of the brain. In BCI operation, the recording interface (i.e., electrodes, for electrophysiological BCI systems) tracks neural information reflecting a person's intent embedded in the on-going brain activity. As discussed in the last section, the most common electrophysiological signals employed for BCI systems include: EEG recorded by electrodes on the scalp; ECoG recorded by electrodes placed beneath the skull and over the cortical surface; and local field potentials (LFPs) and neuronal action potentials (spikes) recorded by microelectrodes within brain tissue. The brain electrical

signals used for BCI operation are acquired by the electrodes, amplified, and digitized.

2. Feature Extractions

The signal-processing stage of BCI operation occurs in two steps. The first step, feature extraction, extracts signal features that encode the intent of user. In order to have effective BCI operation, the electrophysiological features extracted should have strong correlations with the user's intent. The signal features extracted can be in the time-domain or the frequency-domain. The most common signal features used in current BCI systems include: amplitudes or latencies of event-evoked potentials (e.g., P300), frequency power spectra (e.g., sensorimotor rhythms), or firing rates of individual cortical neurons. An algorithm filters the digitized data and extracts the features that will be used to control the BCI. In this step, confounding artefacts (such as 60-Hz noise or EMG activity) are removed to ensure accurate measurement of the brain signal features.

3. Feature Translations

The second step of signal processing is accomplished by the translation algorithm, which converts the extracted signal features into device commands. Brain electrophysiological features or parameters are translated into commands that will produce output such as letter selection, cursor movement, control of a robot arm, or operation of another assistive device. A translation algorithm must be dynamic to accommodate and adapt to the continuing changes of the signal features and to ensure that the possible range of the specific signal features from the user covers the full range of device control.

4. Device Output

The signal features thus extracted and translated provide the output to operate an external device. The output might be used to operate a spelling program on a computer screen through letter selection, to move a cursor on a computer screen], to drive a wheelchair or other assistive devices to manipulate a robotic arm, or even to control movement of a paralysed arm through a neuroprosthesis. At present, the most commonly used output device is the computer screen, and it is used for communication.

IV. CONCLUSION

The Brain Computer Interface has proved to be boon to the disabled persons by providing them independent environment not by manual control but by mere “thinking”. Brain-computer interfaces and their potential applications engender great excitement. However, it must be stressed that in their present state, it remains to be seen how far, and in what direction, applications for BCIs will develop. Hope these systems will be effectively implemented for many Biomedical applications.

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"Combining Biometric Id Cards and Online Credit Card Transaction"

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***Abstract*— Internet shopping, a strong alternative to traditional "go, see, touch and buy" shopping, has been one of the mostly used facilities of the Internet. Several online shopping systems serve internet users all around the world and enable people to get the products they need with a small effort. Internet shopping can be considered as "see and buy" retailing. While the "see" part is implemented by the expertise and imagination of web designers, different payment schemes have been devised for the "buy" part. The most used media are online credit card transaction systems. Several different methodologies have been developed for credit card transactions. However, research has shown that most of internet users do not fully trust credit card payment systems because of financial risks such as loss of money. Various approaches have been performed in order to gain the consumers' trust in credit card transactions; but no solution has been found to overcome the weaknesses in those systems. This paper proposes a new solution that combines biometric ID card with online credit card transactions. Since the implementation details such as the type and the matching algorithm of the biometrics data might vary between countries because of the project requirements and laws, the proposed system remains local for the each country that might adopt the solution. To elucidate the proposed system and provide a concrete example, we used Turkish e-ID pilot system as the identity verification module since it best fits the requirements of the framework.**

***Keywords*—internet shopping; e-ID; biometrics; credit card transaction; multi-factor authentication;**

I. INTRODUCTION

Internet shopping is one of the most popular uses of the internet. As internet technology evolves, more advanced online systems are developed and uses of those systems increase dramatically. Everyday Internet users all around the globe browse merchant Web sites to buy products and services. Users browse the online stores and obtain their needs with minimum effort compared to traditional retailing systems. The difference occurs in the manner of payment; while using a POS device to perform a payment with their credit cards in offline retailing, consumers provide their personal data together with credit card details over the Internet in order to complete an online payment. However, most people do not volunteer giving such details because of financial risks. To calculate the percentages of customers' perceptions in different risks for internet shopping, S. M. Forsythe and B. Shi have analyzed a data set taken from Graphic, Visualization, and Usability (GVU) Centre from Georgia Institute of Technology. In the analysis of the public survey that has been performed with 5645 participants, 23% of the applicants have mentioned financial risk (i.e., risk regarding loss from online credit card usage) in internet shopping. Spoofing, phishing, intrusion, possible malicious changes to the data sent over wire, denial of services (DOS), overcharging the customers are financial risks that discourage internet users from performing online shopping using their credit cards. Several methods have been devised to overcome the financial theft possibilities and gain the costumers' trust back. However, no definite solution has been devised to completely overcome the mentioned risks and promise an entirely safe and theft proof shopping environment for internet users. Using the capabilities of biometric ID card, this framework proposes a safer shopping environment for both consumer and the merchant, which sells products and service over the web. Since the e-ID system provides a ready to use security and identification infrastructure, the banks and the merchants need to spend less effort in integrating the framework then implementing security mechanisms themselves. Though being a local solution because of the specific e-ID implementation, the framework both provides identity verification for the consumers via multi factor authentication and verifies the merchants' institutional info to ensure a safe path of payment from the consumers' bank accounts to the merchants' bank accounts. The deficiency of the E-Commerce transactions has enforced people to research new methodologies. One of such methodologies is Visa's "Verified by Visa" program, which has been then adopted by MasterCard as "MasterCard SecureCode" and by JCB International as "J/Secure". This program introduces a password protection mechanism to online credit card transactions.

The approach is based on a protocol called 3D Secure. In this protocol, the credit card issuer bank approves the fund transfer after authenticating the cardholder via a previously defined password for which the user is prompted during an online credit card transaction. However, being an easy to use system especially for the users, the strength the protocol offers by password approach has also become the weakness because of phishing and key loggers. The side effect to the user is keeping the password secret.

II. AUTHENTICATION AND AUTHERIZATION

Authentication

Authentication is verification of the identity of the entity requesting access to a system. It is the process of determining whether someone or something is, in fact, who or what it is declared to be. In private and public computer networks (including the Internet), authentication is commonly done through the use of logon passwords. Knowledge of the password is assumed to guarantee that the user is authentic. Each user registers initially (or is registered by someone else), using an assigned or self-declared password. On each subsequent use, the

user must know and use the previously declared password. The weakness in this system for transactions that are significant (such as the exchange of money) is that passwords can often be stolen, accidentally revealed, or forgotten.

For this reason, Internet business and many other transactions require a more stringent authentication process. The use of digital certificates issued and verified by a Certificate Authority (CA) as part of a public key infrastructure is considered likely to become the standard way to perform authentication on the Internet. Logically, authentication precedes authorization (although they may often seem to be combined)

Figure 1: Process of authentication

Authorization

Authorization is the process of giving someone permission to do or have something. In multi-user computer systems, a system administrator defines for the system which users are allowed access to the system and what privileges of use (such as access to which file directories, hours of access, amount of allocated storage space, and so forth). Assuming that someone has logged in to a computer operating system or application, the system or application may want to identify what resources the user can be given during this session. Thus, authorization is sometimes seen as both the preliminary setting up of permissions by a system administrator and the actual checking of the permission values that have been set up when a user is getting access. Logically, authorization is preceded by authentication.

III.TYPES OF BIOMETRIC AND OTHER TYPE OF AUTHENTICATION

Types of biometric authentication

- **Fingerprint recognition** – Fingerprint is the most widely used form of authentication where the pattern of a user's fingerprint is used. It can be deployed in a broad range of environments and provides flexibility and increased system accuracy by allowing users to enroll multiple fingers in the template system.

- **Facial recognition** - It uses data related to the unique facial features of a user. It involves analyzing facial characteristics. It is a unique biometric in that it does not require the cooperation of the scanned individual; it can utilize almost any high-resolution image acquisition device such as a still or motion camera.
- **Voice pattern** - This form of authentication uses the unique pattern of a user's voice. It relies on voice-to-print technologies, not voice recognition. In this process, a person's voice is transformed into text and compared to an original template. Although this is fairly easy technology to implement because many computers already have built-in microphones, the enrollment procedure is more complicated than other biometrics, and background noise can interfere with the scanning, which can be frustrating to the user.
- **Handwritten Signature** - Signature verification analysis the way a person signs their name, such as speed and pressure, as well as the final static shape of the signature itself.
- **Retina recognition** - It is a method of biometric authentication that uses data related to unique characteristics associated with the pattern of blood vessels located at the back of an individual's eyes.This technology is personally invasive and requires skilled operators. It results in retina codes of 96 bytes when used for authentication to some Kbytes in the case of identification. Facial recognition techniques exploit characteristics such as relative eyes, nose and mouth positioning, and the distances between them.

- **Iris recognition** - A form of authentication that uses data linked to features associated with the colored part of the eye of a user. It involves analyzing the patterns of the colored part of the eye surrounding the pupil. It uses a fairly normal camera and does not require close contact between the eye and the scanner. Glasses can be worn during an iris scan, unlike a retinal scan.

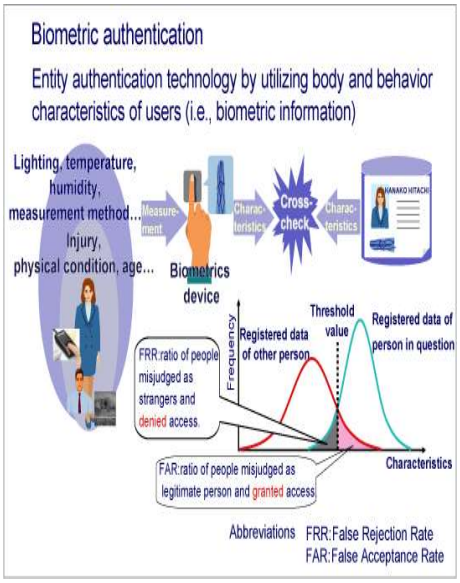

Figure 2: Biometric authentication

IV. E-ID SYSTEM

An identity document(also called a piece of identificationor ID) is any document which may be used to verify aspectsof a person's personal identity. If issued in the form of asmall, mostly standard-sized card, it is usually called an identity card (IC). In some countries the possession of agovernment-

produced identity card is compulsory while inothers it may be voluntary. In countries which do not haveformal identity documents, informal ones may in some circumstances be required.
The EID System is actually three separate services:

- **Identity Management Service** – Provides for the creation and management of identity accounts (commonly called E-ID accounts) for the entire university community.
- **Authentication Service** – Provides an EID credential (e.g., password) verification service and supports login session management for web-based campus services.
- **Directory Service** – Provides "lookup" services for EID identifiers, affiliations, and other information of interest across campus.

Turkish e-id system

Turkish e-ID system is a pilot project that has been started in 2006 by TUBITAK UEKAE and is still in development. The project development is planned to be finished in May 2010. There have been three pilot phases for e-ID card personalization and distribution. The first phase was performed in TUBITAK UEKAE in April 2008 and 100 ID cards were personalized and given to the employees as cardholders. The second pilot phase was carried out in Bolu (Turkey) in three months starting from August 2008 and 13,000 ID cards were personalized and given to citizens. The final phase started in July 2009 and is planned to be finished in May 2010 as the last step of the project. In this final phase, nearly 300,000 ID cards are planned to be personalized and handed over to the citizens. Health care was chosen to be the first application of the Turkish e-ID project. For that, 5 patients' clinics in 1 state hospital, 95 pharmacies and 9 family doctors joined the project for using the ID card in medical treatments and evaluate the services offered by the system. Besides health care, there are also 10 automation companies that are planning to integrate the pilot e-ID project into their identification infrastructure.

Turkish e-ID system, offers different identity verification schemes depending on the required authentication level. The most basic level is the visual identity verification scheme that someone (e.g., a police officer) matches the citizen photo that is printed or engraved on the card surface to the cardholder for identification by naked eye. In this scheme, the security level is very low and fraud possibility is high because of the human factor. The most secure and reliable scenario is an electronic authentication scenario that relies on the citizens smartcard, public data, PIN and biometric verification, in other words multi-factor authentication. Turkish e-ID system components enable this highest level of identity verification to be also used in remote authentication.

Turkish e-ID System Components

Turkish e-ID card is a smart card that operates AKIS national smart card operating system. The citizens' biometric data is stored into a special file element that requires symmetric authentication for read access. Symmetric authentication via External Authenticate and Internal Authenticate APDU commands is performed between the citizen ID card and another special smart card called Secure Access Module (SAM), which is embedded into the special Card Access Device (CAD) that is designed by TUBITAK UEKAE. SAM contains symmetric keys that are needed to verify a citizen card and asymmetric keys and certificates that are issued by governmental certificate authorities. CAD is a specialized card reader that is also capable of enrolling and verifying fingerprint and finger-vein data.

Remote Biometric Authentication in Turkish e-ID system

Having an embedded SAM card and biometric enrolment support, CAD is able to access the fingerprint or finger vein data of the citizen, verify the data locally and sign the biometric verification result so that the result can be verified at remote systems. The CAD requires user's PIN input, performs data matching and creates a signed single use identity verification package (IVP). IVP contains timestamp, the biometric matching result, the citizen's demographic data, arbitrary data field that might be used for signing external data and the SAM's certificate. Since governmental certificate authorities issue the CAD certificates, any remote system will be sure that a higher authority approves the authentication result by validating the package via the official identity verification service (IVS), a web service provided in the e-ID system. The IVS marks the IVP as expired after validation in order to guarantee that it has been used only once.

V.PROPOSED FRAMEWORK

Having a remote biometric authentication system available, we demonstrate online credit card transaction system prototype. The structure of the system is depicted in figure 2. We have grouped the system components into domains according to their roles and relations. The verification domain contains two components, the IVS and the issuing bank, which as the name implies issues the customer's credit card and performs payment according to identity verification result. Acquiring domain represents the target of the payment. There are two components of this domain, 1) the merchant that sells products or service to the customer and 2) the acquiring bank, which provides the merchant's account that the transfer will be made to. The customer domain stands for the user side of the system and has four components; 1) the customer's computer, 2) biometric ID card, 3) CAD and 4) the customer. In this framework, we do not only aim the identification of the customer but also we verify the merchant and order data to ensure a proper fund transfer. To achieve this we use the arbitrary data field of IVP to store the order details package (ODP) which is created by the merchant. The ODP is a signed package that contains the merchant's info and bank account details, order info and merchants public certificates. This approach protects both the customer and the merchant; because the IVP now contains both source and target accounts; and the certificates of sides ensure the integrity of IVP and ODP and protect the transaction from malicious attempts. Another approach is, using virtual credit card number in online payments. In this approach, a credit card holder is assigned a virtual credit card that shares the same account as the cardholder's physical credit card. It can be used in online transactions as a traditional credit card until its expiry date. The virtual card has a card number, a CVC number, an expiry date and a flexible monetary limit that can be redefined by the user prior to a transaction and reset periodically. The advantage offered by a virtual credit card is that, even if the credit card number is stolen together with other details, it cannot be used until the user redefines a new temporary limit for a new transaction. Though decreased, the theft possibility occurs between the time span starting with a limit redefinition and ending with a transaction or

periodical reset. An alternative to virtual credit card, which can be used several times, is the "Single Use Card Number". In this approach, the card-issuing bank provides the user a single use card number, which expires after single use in a transaction. This approach limits fraud possibility; and defeats the key loggers because of single use. However, this approach forces the user to perform a purchase with this number as soon as possible, because keeping the number secure becomes a challenge for the user. Although being valuable and widely used approaches, the current solutions remain specific for each bank and customer pair. Either the users have to keep several passwords secret for each credit card they own and deal with worm and key-logger issues themselves or spend time keeping track of single use or virtual credit card numbers. A more user friendly and securer approach is needed in order to both keep users satisfied and make them feel safe when they attempt to make online purchases. The idea of using biometric ID card in online transactions comes into play at this point, because it offers several usage advantages and a more powerful and legitimate identity verification mechanism.

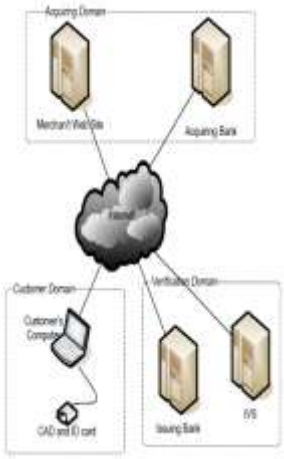

Figure 3: Overview of the framework

VI.ADVANTAGES OF BIOMETRIC ID CARD IN CREDIT CARD TRANSACTION

Biometric ID card provides multi-factor authentication (MFA), a security system in which multiple authenticators are used in order to increase the validity of identity verification. Some of those authenticators are passwords, tokens, keys, cards and biometrics.

Authentication factors for MFA are usually grouped into these three categories: 1) what you know (e.g., password), 2) what you have (e.g., token), and 3) who you are (e.g., biometric). Combination of these categories decreases the vulnerability that arises when each authenticator is used alone in an authentication scenario. In other words, hacking one's secret password is easier than hacking the password and fingerprint together. Thereby, multi-factor authentication provides a more reliable infrastructure than a traditional password authentication scheme.

Biometric ID card implements the three categories of MFA as follows. 1) "What you know" is the PIN of the e- ID card, 2) "What you have" is the smart card that is issued by the government to the citizen, and 3) "Who you are" is the biometric data of the citizen saved securely in the smart card or a central database for biometric authentication and play the key role in identification. As being passwords that are physically bound to human and not needed to be memorized, biometrics provides more reliable identity verification ("Is this person who he claims to be?"). Consequently, if the used biometric verification system is powerful enough, it nearly becomes impossible to perform an online transaction without the customer's knowledge, even if someone steals her card and PIN somehow.

Another advantage of biometric ID card is that the e-ID system provides an authentication scheme that is approved by the governmental authorities. This introduces a more legitimate and central identity verification framework, which can be utilized in different applications. Hence, various organizations such as health care institutions, banks, police officers might integrate this central authentication framework into their systems for specific identity verification needs. This makes the biometric ID card the central key and enables citizens to use the same card in every application via a card access device. Thereby, the citizen does not need to memorize several passwords or keep tokens for each account she has but the PIN number and the ID card. Using the central biometric identity verification framework, a bank will be able to verify the identity of the person who needs to perform a remote transaction (e.g., online purchase). This saves the banks from investing large amounts of money to research a powerful authentication mechanism and enables them spend less effort and financials by integrating an already tested and ready to use security infrastructure.

The proposed framework has been exemplified using Turkish e-ID System since the system and its components best fit the MFA requirements of the framework. Thereby, we introduce the Turkish e-ID system, which is an ongoing pilot project, and denote how the facilities it provides can be integrated into our framework.

CONCLUSION

Security in online payment systems has been a wide research area since the early days of the Internet and several approaches have been devised by various organizations. However, there has been no certain solution overcome the deficiencies in these systems completely.

Looking at the problem from a different mirror, we have introduced a solution based on the rapidly developing smart card based biometric ID systems and given a sample implementation on Turkish e-ID system. The sample implementation is explained with a successful purchase scenario.

The combination of biometric ID cards and online transaction might be used in countries that use biometric ID card with some modifications according the specific implementation details of their e-ID solutions. Although the solution is not global because of the e-ID system differences for each country, it provides high security and safety for both the customer and the merchant in local e-commerce systems.

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Neuro-Soft Computing Approach for the Design of Near-Optimal Classifier for Quality Assessment of Food Product

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Abstract **-This paper gives the best neural network classifier for quality assessment of food product.We are using Back propogation network, multilayer perceptron & Radial basis fuction for this perpose, And finally best network will be choosen for the quality Assessment.**

Keywords **–Neural network, Sensors,MLP, Radial Basis Function**

1. INTRODUCTION

Electronic noses (E-Nose) have been developed as systems for the automated detection and classification of odors, vapors, and gases. Electronic Nose is a smart instrument that is designed to detect and discriminate among complex odours using an array of sensors. The array of sensors consists of a number of broadly tuned (non-specific) sensors that are treated with a variety of odour sensitive biological or chemical materials. This instrument provides a rapid, simple and non-invasive sampling technique, for the detection and identification of a range of volatile compounds. The key function of an electronic nose is to mimic human olfactory system. The human nose is still consideration the primary tool employed in industry to characterize the odour of a variety of consumer products. E-Nose is a device that identifies the specific components of an odor and analyzes its chemical makeup to identify it [1].To humans, the sensation of flavor is due to three main chemoreceptor systems. These are gustation (sense of taste by tongue), olfaction (sense of smell by nose) and trigeminal (sense of irritation of trigeminal receptors). The sense of taste is used to detect certain non-volatile chemicals, which enter the mouth. The sense of smell is used to detect certain volatile compounds. Receptors for the trigeminal sense are located in the mucous membranes and in the skin. They respond to certain volatile chemicals and it is thought to be especially important in the detection of irritants and chemically reactive species. In the perception of flavor all three chemoreceptor systems are involved but olfaction plays by far the greatest role.

The proposed research aims at design of near-optimal classifier using neural networks for quality analysis of food or dairy products using E-Nose. The data generated by E-Nose are non-linear and overlapping in the feature space. This justifies the applicability of Nero-Soft Computing Approach for the input data classification in food or dairy product industry. The proposed research aims at the design of near-optimal classifier for quality analysis/ assessment of food or dairy products using E-Nose.

1.1 Aims and Objectives:

E-Nose is a new and promising technology which aimed to rapidly becoming a valuable tool for the organoleptic evaluation of food parameters related to taste and smell and could replace human sensory panels in quality control applications, wherethe objective, rapid and syntheticevaluation o f the aroma of many specimens is required. An electronic nose is generally composed of a chemical sensing system (sensor array or spectrometer) and a pattern recognition system, such as, artificial neural network [2]. The proposed system aims at providing, real-time, knowledge of odor being produced by E-Nose to assess the quality of food or dairy products.

E-Noseconsists of a sampling system (for a reproducible collection of the mixture), an array of sensors (which is the heart of the system), electronic circuitry and data analysis software [1].E-Nose using arrays of chemical sensors can be divided into three categories according to the type of sensitive material used: inorganic crystalline materials (e.g. semiconductors, as in MOS-FET structures, and metal oxides); organic materials and polymers; biologically derived materials. Comparatively to classical techniques (e.g. the combination of gas chromatography and mass spectroscopy (GC-MS)), E-Nose are simpler and more accurate devices. They recognize a fingerprint that is global information, of the samples to be classified [3,4].

An essential objective of this research work is to ensure that the technology would be robust, sufficiently sensitive, and able to identify and quantify odors from food or dairy products. An odour stimulus generates a characteristic fingerprint (or smell-print) from the sensor array. Patterns, or finger-prints, from known odours are then used to construct a database and train a pattern recognition system so that unknown odours can subsequently be classified, i.e. identified. Thus E-Noses comprise of mechanical components to collect and transport odours to the sensor array as well as electronic circuitry to digitize and store the sensor responses for signal processing.

Generally speaking, electronic noses are faster to respond, easier to use and relatively cheaper in comparison with conventional analytical techniques, such as gas chromatography/mass spectroscopy and flame ionization detection, so that they have wide applications in environmental monitoring [5, 6] , food and beverage industry , medical diagnosis [7], public security [8] , odour classification of grains [9] and others.

Dealing with E-Nose signals is still crucial for artificial olfaction to reliably recognize various odors due to time variance of the signals. Aim of this research work is to develop Neural Network based Near-Optimal Classifier to assess the quality food or dairy product, such as, tea or basmati rice or milk using E-Nose.

Existing method to check the quality of these products is done by Human Tester. For example tea quality/grade is decided on the basis of decision given by Tea Tester who is a human being. There is a lot of error, deviation in the measurement by human being. To avoid this optimum classifier system based on electronic nose using neural network could be designed which would more reliable and accurate [28, 29].

1.2 Scope and Limitation

Using Electronic-nose we can sense a smell and with a technology called Digital scent technology it is possible to sense, transmit and receive smell through internet, like smelling a perfume online before buying them, sent scented E-cards through scent enabled websites, and to experience the burning smell of rubber in your favorite TV games etc. As a multidisciplinary research, most studies on electronic noses focused on the sensitivities of the chemical sensor array and the pattern recognition methods to process the signals obtained from the sensor array. With the development of functional material technology, signals can be obtained via various sensors, such as metal oxide semiconductor, optical, con-ducting polymer (CP), quartz crystal microbalance and surface acoustic wave sensors [10] . Some pattern recognition methods have been introduced into electronic noses [11, 12]. Neural networks are usually considered to be one of the most promising methods to solve this complex and non-linear problem, because they can cope with nonlinear problems and handle noise or drift better than conventional statistical approaches. So many neural networks to process signals from sensor arrays are reported, such as back propagation trained neural network [13] , radial basis function neural network, probabilistic neural network , self-organizing network.

There are few disadvantages to the E-Nose technology which includes the price. The cost of an E-Nose is very high which the main hurdle in doing the research work. Another disadvantage has been the delay between successive tests, the time delay ranging between 2 to 10 minutes during which time; the sensor is to be washed by a reactivating agent, which is applied to the array so as to remove the odorant mixture from the surface and bulk of the sensors active material [26].

2 LITERATURE REVIEW

A brief review of the research works in relation to the E-Nose is as follows:

Ritaban Dutta, and Ritabrata Dutta [14] has presented in research on Electronic Nose basedENT bacteria identification in hospital environment is a classical and challenging problem of classification. An electronic nose (e-nose), comprising a hybrid array of 12 tin oxide sensors (SnO_2) and 6 conducting polymer sensors has been used to identify three species of bacteria, *Escherichia coli* (*E. coli*), *Staphylococcus aureus* (*S. aureus*), and *Pseudomonas aeruginosa* (*P. aeruginosa*) responsible for ear nose and throat (ENT) infections when collected as swab sample from infected patients and kept in ISO agar solution in the hospital environment.

S. Ampuero and J.O. Bosset [15] have proposed the model for Electronic Nose. Most of the reported applicability studies of electronic noses to different aspects of quality assessment in dairy products show satisfactory results. Published literature reports the classification of dairy products by sample type with MOS sensors; by ageing with MOS, CP and MS-based instruments; by geographic origin with an MS-electronic nose; by processing stage with CP sensors. A successful model for milk shelf-life prediction was implemented with a MOS system. The identification and classification of different types of quality-deterioration have also been published: different off-odours in milk with an MS-based tool, lower quality of casein samples with MOS sensors, identification of microbial contamination in milk with CP, MS, etc. Nevertheless, in most cases the results will have to be confirmed on a larger scale to make sure that the classifications obtained are still valid with a larger intra-group variability, which is generally found in the case of natural products.

Simona Benedetti*et. al.* [16] have suggested a model of Electronic Nose for honey classification. Seventy samples of honey of different geographical and botanical origin were

analyzed with an electronic nose. The instrument, equipped with 10 Metal Oxide Semiconductor Field Effect Transistors (MOSFET) and 12 Metal Oxide Semiconductor (MOS) sensors, was used to generate a pattern of the volatile compounds present in the honey samples. The sensor responses were evaluated by Principal Component Analysis (PCA) and Artificial Neural Network (ANN). Good results were obtained in the classification of honey samples by using a neural network model based on a multilayer perceptron that learned using a back propagation algorithm. The methodology is simple, rapid and results suggest that the electronic nose could be a useful tool for the characterization and control of honey.

Huichun Yu and JunWang [17] made investigation to evaluate the capacity of electronic nose to classfiy the tea quality grade. In their experiment the volume of vial and headspace generated time were considered corresponding to the 5 g. tea samples. The four tea groups were measured and response values at four different collection times were conducteed by PCA, LDA and ANN. The method of ANN was performed and 90 % of the total tea samples were classified correctly by using the back-propogation neural network.

Jun Fu *et. al.* [18] developed a model in which the concept of Electronic Noise is used for pattern recognition.In this paper, a biologically inspired neural network, based on anatomical and electroencephalographic studies of biological olfactory systems, is applied to pattern recognition in electronic noses. Classifying six VOCs commonly presented in the headspace of Chinese rice wine, its performance to eliminate the concentration influence and counteract sensor drift is examined and compared with the simple nonparametric algorithm and the well-known BP-NN.The neural network has a good performance in classification of six VOCs of different concentrations, even for the patterns obtained 1 month later than what was used for training. Its flexibility and robust fault tolerance are quite suitable for electronic nose applications, subjecting to the problems associated with the susceptibility to concentration influence and sensor drift.

As per Federica Cheli *et. al.* [19] proposed that it is possible to differentiate and classify maize samples contaminated and non-contaminated with aflatoxins by using an electronic nose equipped with 10 MOS sensors. Despite the small number of samples, the electronic nose was able to detect a clear difference in volatile profile of maize in the presence and absence of aflatoxins using PCA analysis. By the use of LDA a correct classification of maize contaminated and non-contaminated with aflatoxins was achieved. Results indicate that electronic nose may be successfully applied as rapid and non-destructive method for screening of commodities contaminated with fungal toxins, in order to select samples that must undergo further accurate quantitative analysis. Further improvements of the model are needed in order to eliminate or minimize the component in the model not directly related to aflatoxins concentration, to evaluate the potentiality of classification below/above legal limits and maybe to develop robust regression models for prediction of aflatoxin content in maize samples.

J. Brezmes *et. al.*[20] made investigated on the use of a concentration chamber in the E-Nose has also proven to be very useful; signals are stronger because fruit vapors are accumulated during a long period of time and many pieces can be measured together. More-over, since group measurements can be done, our proto-type can be easily adapted to practical applications where single piece measurements are not cost-effective. The results obtained prove that our Electronic Nose monitors peach and pear ripeness successfully. Measurements with apples were not as good and further research will be done in order to increase the accuracy with this particular fruit.

W.A. Collier *et. al.* [21] proposed a model in which an electronic nose can be used to discriminate among four milk samples, among four yoghurt samples, and among four cultured and non-cultured dairy products with a high degree of success if the measurements on the samples were all made in a single experiment. It has also been demonstrated that a ‘‘single-electrode’’ array can be used to make these discriminations. More rigorous control of manufacturing conditions of arrays or preparation steps could ensure that the sensing surfaces are more reproducible, enabling classification of samples based on previously stored databases of training sets.

S.Capone, M. Epifani, F. Quaranta, P. Siciliano, A. Taurino, L. Vasanelli [22] developed a model in which the rancidity of milk by means of electronic nose and dynamic PCA analysis. Semiconductor thin films based electronic nose were used to recognise the rancidity of two differeent kinds of milk (UHT and pasteurised) during their ageing days. The employed sensor array consists of five different SnO2 thin films prepared by means of sol-gel technology. The data coming from the response of sensors have been elaborated by PCA, in order to obtain a classification of the data clusters related to different milk ageing days and so track the dynamic evolution of milk rancidity.

Graham E. Searle and Julian W. Gardner [23] presented linear black-box (inverse) models for an E-nose system that can be successfully employed for strain classification of cyanobacteria. The models performed as well as the previously employed artificial neural network techniques, with the advantage that they require less computing power to implement. However, for the more complex problem of growth phase classification, the technique was only moderately successful; failing to compete with the results obtained elsewhere using nonlinear neural network techniques. Thus such modeling techniques could be appropriate for use in relatively simple applications where available computing power is limited, such as in a handheld

instrument. Future refinements of the techniques could make them suitable for more challenging classification problems, where currently artificial neural networks are most suitable.

Vassilis S. Kodogiannis*et. al.* [24] presented an alternative approach based on gas-sensing technology was taken to investigate the suitability of such a system as a point-of-care device. It should be emphasized here that this system is not being proposed as a replacement for a clinician's diagnosis but rather to supplement other diagnostic methods. It also helps the clinician deliver better service as the E-Nose system has the potential advantage of making decisions 24 h per day, seven days per week. This study suggests that the e-nose combined with advanced learning-based processing tools is able to identify specific bacterial pathogens with accuracy and speed, even with a small sample quantity, at the point-of-care. Chronic renal failure and tuberculosis are also two diseases where people could benefit from new point-of-care devices based on gas sensors.

Marco Trincavelli*et. al.* [25] used E-noses to discriminate among various bacteria regularly found in the blood cultures. This is an important application of electronic olfaction that could significantly improve the current methodologies and be successfully used in clinical settings. The results presented show that the bacteria can be accurately discriminated using the method. Further the proposed methods have been tested on a large dataset, (an order of magnitude larger than earlier studies). Their next step will be the starting of clinical trials to test the robustness of the method and its applicability in a clinical setting. In particular, they will examine the effect of the genealogy of the bacteria (i.e., different strains of the same species on discrimination performance).

From the extensive literature review it is evident that the concept of E-Nose is applied in the field of health care, environment and food industry. Currently the biggest market for electronic noses is the food industry. Applications of electronic noses in the food industry include inspection of food quality by odour, control of food cooking processes, inspection of fish, monitoring the fermentation process, checking rancidity of milk etc. In food industry, quality assurance systems need to be rapid and more accurate. Generally qualitative assessment of food spoilage is made by human sensory panels that evaluate air samples and discriminate which food products are good or unacceptable. Bacterial contamination of food and drinks can generate unpleasant odours and toxic substances. Therefore, different industries are interested in the application of E-Nose both for monitoring of storage quality degradation and for detecting microbial contaminants. Electronic nose can be used for accurately detection for all contaminations in the food product. In some instances E-Nose can be used to augment or replace panels of human experts. In other cases, E-Nose can be used to reduce the amount of analytical chemistry that is performed in food in food production especially when qualitative results will do.

3. PROPOSED METHODOLOGY DURING THE TENURE OF THE RESEARCH WORK

The demand of E-nose in food or dairy industry is growing because of its versatility and ease of operation of these instruments make them appropriate for fast and accurate analysis of various products or for monitoring the quality in the production process. The study has shown that commercial E-Nose can be used for the evaluation of various products in these industries. The uses of E-Nose can successfully distinguished quality of products such as tea, coffee, honey, basmati rice etc. The E-Nose can also be used to know the pollution of the gases emitted by various industries

The special features of neural networks such as capability to learn from examples, adaptations, parallelism, robustness to noise, and fault tolerance have opened their application to various fields of engineering, science, economics, etc. In all types of artificial neural networks, the basic structure consists of a number of interconnected processing units, called neurons. The calculations that each neuron performs, along with the way that the neurons are interconnected, determine a particular neural network type.

The advantage of neural classifiers over linear classifiers is that they can reduce misclassifications among the neighborhood classes as shown in following Fig. 1. The use of neural networks in this work is therefore proposed due to its learning ability, and capacity for solving nonlinear and complicated problems.

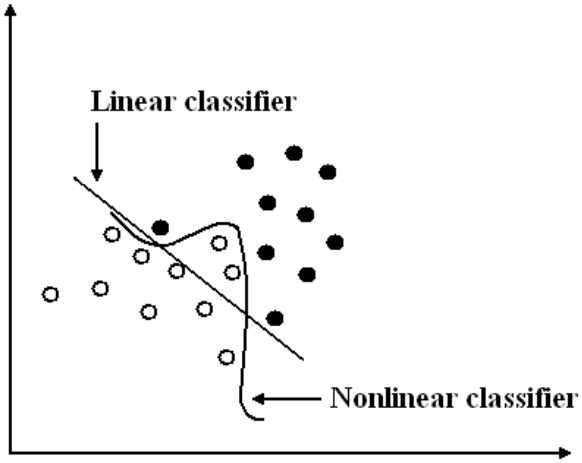

Fig. 1 Neural networks based classifier verses linear classifier

The main objective of our research is to classify the quality of food or dairy product available in the market by employing an efficient near-optimal neural network based classifier using E-

Nose. Pattern recognition is an important part of E-Nose technology would be done using neural networks. The main problem associated with neural network is long processing time and large training sample required. The main advantages using this algorithm are learning may be fast and parallel computing is possible, weight analysis is easier for modular network, better generalization performance. The design of neural network will be done using MATLAB or Neurosolutions softwares

Actual experiment on electronic–nose will be done at CDAC-Kolkata and database will be generated. CDAC-Kolkata has given permission to perform experiments at their facility on the E-Nose set up. The unique and dominant features of the data set shall be extracted from the E-Nose after performing experiments. The features will then be applied to the Neural networks to train and design it optimally so as to further classify the test product to know its quality.

Implementation Scheme in various phases**:**

1) Study of the sensors chosen for classification.
2) Nonlinear parameter identification of the selected sensors.
3) Development of a basic neural network based model for sensor data classification.
4) Development different possible efficient neural network models for that, and their comparison.
5) Determination of best possible neural network model from the various efficient models implemented.
6) Testing and validation of the final neural network model.

In this research, it is proposed to use different neural network structures such as MLP, Generalized Feedforward Neural Networks, Modular Feedforward Neural Networks, Principal Component Analysis NN, RBF NN, and Support Vector Machines for modeling of different intelligent sensors undertaken. The generalization performance of different models will be validated meticulously on the basis of the following important parameters:

- MSE on train, cross-validation and test data
- NMSE on train, cross-validation and test data
- Correlation coefficient for train, cross-validation and test data
- % Error for train, cross-validation and test data
- Akaike's Information Criterion for train, cross-validation and test data
- Minimum descriptive length for train, cross-validation and test data
- Sensitivity Analysis for train, cross-validation and test data
- Receiver Operating Characteristics for train, cross-validation and test data
- Confusion matrices for train, cross-validation and test data

4. IMPLICATIONS

Electronic Nose is an important concept which is used in food industries to assess the quality of food. Food products contain off-flavor compounds created by a variety of mechanisms, such as, through the action of natural and microbial enzymes and chemical changes catalyzed by light or heavy metals. However, detection of aroma compounds using electronic noses has become more and more important.Potential applications in odor assessment by electronic noses in the food area are numerous; they have been used for quality control, monitoring process, aging, determination of geographical origin, adulteration, contamination, and spoilage.

There is no universal sensor system that can solve all odor analysis problems. Instead there is a need to employ intelligent application-specific sensor systems that are appropriate to the application. This means building in intelligence through the development of suitable sensor structures, sensor materials and pattern recognition methods. New pattern recognition methods would make use of the transient information in the sensor signal to enhance the identification ability of the system. This requires the use of dynamic models, for the sensor system, which can account for the drift in sensor parameters.

This research work is an attempt to develop a Neuro-Softcomputing system to assess the quality of food product which will be more accurate, more reliable, and optimal.

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Short Term Hydrothermal Scheduling Using Fuzzy Decision Making Technique

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***Abstract*—There are so many techniques for solving the hydro thermal scheduling problem, and many researchers have done so many work regarding hydrothermal scheduling by using different techniques like particle swarm optimization, fuzzy decision making technique, and newton raphson method for solving hydrothermal scheduling problem. Hydrothermal scheduling can be done in three basis, for long term medium term and short term basis. But here in this paper short-term fixed head hydrothermal scheduling using fuzzy decision making technique is used for solving the hydrothermal problem and for minimizing the total cost, and for minimizing the gaseous pollutants like SO2, NO2,CO2 emissions. In order to get the minimum overall production cost.**

***Key words*—Hydrothermal scheduling, fuzzy decision.**

I INTRODUCTION

In a modern power system there may be several conventional hydro plants which is connected to various load centres via a lossy transmission network with negligible incremental cost involved in hydro generation. The main problem is to minimize the operating cost of the hydro thermal system so as to minimize the fuel cost of the thermal plant under the constraint of water available for the hydro generation for a specified time, then we can achieve the hydro thermal scheduling in a planned way [2]. Many approaches and methods have been proposed to solve the hydro thermal scheduling problem, hydro thermal scheduling of power system with stochastic inflow , with Newton rap son method , with particle swarm optimization technique and with the use of modular and software method for solving the hydrothermal optimization problem etc. [3-5].

The basic aim of hydro thermal scheduling is to minimize the generation cost of the power system however to meet environmental regulations enforced in current years. Emission control has turn into one of the important operational aim in thermal power generation there are so many gaseous pollutants like SO_2, CO_2, $NO_2$from thermal generating plants. In scheduling of hydro thermal power plant the main concern is to minimize these gaseous pollutants as well as cost and losses but here we reducing only the emissions of oxides of carbons and oxides of sulphur.

In hydrothermal co-ordination our main concern is to minimize the overall cost of the operating system and to reduce the losses as well as gaseous pollutants subject to the operating constraint of hydro and thermal plants, over the optimization interval. The integrated operation of hydro thermal system is divided into two separate problems, long range problem and short range problem. The validity of time period for long range problem is ranges from 1 year to several years and for short range problem hour by hour scheduling is required. Since the time period for the short range is small, so the water inflows and loads are considered fully known with complete certainty.

II ECONOMIC LOAD DISPATCH PROBLEM

In the objective problem formulation two important in an electrical thermal power system are considered. These are economy and environmental impact because of so_2 & co_2 emissions. The optimization problem is defined as:

Minimize $F_1=\sum_{i=1}^{NG}(a_i p^2_{gi}+b_i p_{gi}+c_i)$ *Rs/hr*

Minimize $F_2 = \sum_{i=1}^{NG}(d_{1i} p^2_{gi}+e_{1i} p_{gi}+f_{1i})$ *Kg/h*

Minimize $F_3 = \sum_{i=1}^{NG}(d_{2i} p^2_{gi}+e_{2i} p_{gi}+f_{2i})$ *Kg/h*

Minimize $F_4 = \sum_{i=1}^{NG}(d_{3i} p^2_{gi}+e_{3i} p_{gi}+f_{3i})$ *Kg/h*

Subject to $\sum_{i=1}^{NG}(p_{gi} - (P_D + P_L) = 0$

$$P_{gi}^{min} \le P_{gi} \le P_{gi}^{max} \qquad (i = 1,2,.....,NG)$$

Where
NG is the number of total generators
a_i, b_i, c_i are the cost coefficient
d_{1i}, e_{1i} and f_{1i} are so_2 emission coefficients
d_{2i}, e_{2i} and f_{2i} are co_2 emission coefficients
P_D is the power demand
P_L is the transmission losses, which are approximated in terms of B-coefficients

III DECISION MAKING

"Consider the imprecise nature of the decision maker's judgment, it is natural to assume that the decision maker may have fuzzy or imprecise goals for each objective function. We can define the fuzzy sets by the equation which is known as membership function. These functions shows the degree of membership in some fuzzy sets using values from 0 to 1". [16]. "The membership

value 0 shows incompatibility with the sets, while 1 means complete compatibility. By taking description of the minimum and maximum values of each objective function together with the rate of increase of satisfaction, the decision maker must detect membership function μ(Fi) in a subjective manner. Here it is assumed that μ(Fi) is strictly monotonic decreasing and continuous function" defined as:

$$\mu(Fi) = \begin{cases} 1 & ; Fi \le Fimin \\ \frac{Fimax - Fi}{Fimax - Fimin} & ; Fimin < Fi < Fimax \\ 0 & ; Fi \ge Fimax \end{cases}$$

(i=1,2,……..,m)

the value of membership function shows that how far in the scale from 0-1 a non-inferior solution is satisfying the F_i objective. The some of all the membership function values μ(Fi) (i= 1,2,3,….m) for all the objectives can be find out in order to measure the accomplishment of each non-dominated solution can be rated with respect to all the k non-dominated solutions by normalizing its accomplishment over the sum of accomplishment of k non-dominated solutions as follows:

$$\mu^{k}_{D} = \frac{[\sum_{i=1}^{M} \mu(Fik)}{[\sum_{k=1}^{K} \sum_{i=1}^{M} \mu(Fik)]}$$

thefunction μD can be used as a membership function for non-dominated solutions, in a fuzzy set and expressed as fuzzy fundamental priority ranking of the non-dominated solutions. the solutions that attains the maximum membership μ^{k}_{D}, in the fuzzy set so obtained can be chosen as the 'best' solution or the one having cardinal priority ranking.

IV ALGORITHM

$F_1(P_g)$, $F_2(P_g)$ are the objective functions to be minimized over the set of admissible decision vector P. To generate the non-inferior solution to the specified intent problem, we use a weighting method. In this weighting method we convert the problem into a scalar optimization as given below

Minimize $\sum_{k=1}^{M} w_k F_k (P_{gi})$

Subject to $\sum_{i=1}^{NG} P_{gi} - (P_D + P_L) = 0$

$P_{gi}^{min} \le P_{gi} \le P_{gi}^{max}$ $(i = 1,2,\ldots..,NG)$

$\sum_{k=1}^{M} w_k = 1$ $(w_k \ge 0)$

Where

This approach yields meaningful result to the decision maker when solved many times for different values of w_k (k=1,2,…M). weighting factors w_k are determined based on the relative importance of various objectives, which may vary from place to place and utility to utility. The constrained scalar optimization problem is converted into unconstrained scalar optimization problem. Each constrained equation as associated with an multiplier function known as lagrange multiplier. The desired objective function is

$$L = \sum_{k=1}^{M} w_k F_k + \lambda (P_D + P_L - \sum_{i=1}^{NG} P_{gi})$$

By taking the partial derivative of the augmented objective function with respect to the decision variable.

$$\frac{\partial L}{\partial Pgi} = \sum_{k=1}^{M} wk \frac{\partial Fk}{\partial Pgi} + \lambda \left(\frac{\partial PL}{\partial gi} - 1\right) = 0$$

$(i = 1,2,\ldots\ldots..,NG)$

$$\frac{\partial L}{\partial \lambda} = P_D + P_L - \sum_{i=1}^{NG} P_{gi} = 0$$

Where,

$$\frac{\partial F1}{\partial Pgi} = 2a_i P_{gi} + b_i$$

$$\frac{\partial Fk+1}{\partial Pgi} = 2d_{ki} P_{gi} + e_{ki} \qquad (k = 1,2,3)$$

$$\frac{\partial L}{\partial Pgi} = B_{i0} + \sum_{j=1}^{NG} 2B_{ij} P_{gj}$$

These equations are obviously nonlinear.

We use classical method to solve these equations and to find a solution with a appropriate initial guess formerly the water constrained & LaGrange multiplier is obtained, the generation of thermal and hydro unit can be determined.

V CONCLUSION

The uncertainties present in water inflows, system load demand, operating cost equation coefficient and NOx emission coefficients affects the short term hydrothermal schedule. The generation schedule based upon deterministic cost function result in the lowest expected overall cost. The proposed method provide the means to consider

1) The inaccuracies and uncertainties in the hydrothermal schedule.

2) Allowed explicit trade-off between overall operating cost, NOx emission and risk level with the weightage given and

3) And provide the decision maker with the best solution from the non-inferior solution with the help of fuzzy set theory. In this paper also we are using a fuzzy decision making technique in order to get the overall minimum production cost of the entire hydrothermal system. And also for the minimization of gaseous pollutants like NO_x emission, SO_2 & CO_2 emissions.

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Artificial Intelligence and Learning Computers

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***Abstract*—** The term **artificial intelligence** is used to describe a *property* of machines or programs: the intelligence that the system demonstrates. Among the traits that researchers hope machines will exhibit are reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects. Constructing robots that perform intelligent tasks has always been a highly motivating factor for the science and technology of information processing. Unlike philosophy and psychology, which are also concerned with intelligence, AI strives to build intelligent entities such as robots as well as understand them. Although no one can predict the future in detail, it is clear that computers with human-level intelligence (or better) would have a huge impact on our everyday lives and on the future course of civilization Neural Networks have been proposed as an alternative to Symbolic Artificial Intelligence in constructing intelligent systems. They are motivated by computation in the brain. Small Threshold computing elements when put togetherproduce powerful information processing machines. In this paper, we put forth the foundational ideas in artificial intelligence and important concepts in Search Techniques, Knowledge Representation, Language Understanding, Machine Learning, Neural Computing and such other disciplines.

V. INTRODUCTION

Starting from a modest but an over ambitious effort in the late 50's, AI has grown through its share of joys, disappointments and self-realizations. AI deals in science, which deals with creation of machines, which can think like humans and behave rationally. AI has a goal to automate every machine.

AI is a very vast field, which spans:

- Many application domains like Language Processing, Image Processing, Resource Scheduling, Prediction, Diagnosis etc.
- Many types of technologies like Heuristic Search, Neural Networks, and Fuzzy Logic etc.
- Perspectives like solving complex problems and understanding human cognitive processes.
- Disciplines like Computer Science, Statistics, Psychology, etc.

DEFINITION OF INTELLIGENCE & TURING TEST

The Turing Test, proposed by Alan Turing (1950), was designed to provide a satisfactory definition of intelligence. Turing defined intelligent behavior as the ability to achieve human-level performance in all cognitive tasks, sufficient to fool an interrogator. Roughly speaking, the test he proposed is that the computer should be interrogated by a human via a teletype, and passes the test if the interrogator cannot tell if there is a computer or a human at the other end. His theorem (the Church-Turing thesis) states that "Any effective procedure (or algorithm) can be implemented through a Turing machine. " Turing machines are abstract mathematical entities that are composed of a tape, a read-write head, and a finite-state machine. The head can either read or write symbols onto the tape, basically an input-output device. The head can change its position, by either moving left or right. The finite state machine is a memory/central processor that keeps track of which of finitely many states it is currently in. By knowing which state it is currently in, the finite state machine can determine which state to change to next, what symbol to write onto the tape, and which direction the head should move.

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write onto the tape, and which direction the head should move.

Requirement of an Artificial Intelligence system

No AI system can be called intelligent unless it learns & reasons like a human. Reasoning derives new information from given ones.

Areas of Artificial Intelligence

Knowledge Representation

Importance of knowledge representation was realized during machine translation effort in early 1950's. Dictionary look up and word replacement was a tedious job. There was ambiguity and ellipsis problem i.e. many words have different meanings. Therefore having a dictionary used for translation was not enough.

One of the major challenges in this field is that a word can have more than one meaning and this can result in ambiguity.

E.g.: Consider the following sentence
Spirit is strong but flesh is weak.
When an AI system was made to convert this sentence into Russian & then back to English, following output was observed.
Wine is strong but meat is rotten.
Thus we come across two main obstacles. First, it is not easy to take informal knowledge and state it in the formal terms required by logical notation, particularly when the knowledge is less than 100% certain. Second, there is a big difference between being able to solve a problem "in principle" and doing so in practice.
Even problems with just a few dozen facts can exhaust the computational resources of any computer unless it has some guidance as to which reasoning steps to try first.
A problem may or may not have a solution. This is why debugging is one of the most challenging jobs faced by programmers today. As the rule goes, it is impossible to create a program which can predict whether a given program is going to terminate ultimately or not.

Reasoning

It is to use the stored information to answer questions and to draw new conclusions. Reasoning means, drawing of conclusion from observations.

Reasoning in AI systems work on three principles namely:
DEDUCTION: Given 2 events 'P' & 'Q', if 'P' is true then 'Q' is also true.
E.g.: If it rains, we can't go for a picnic.

INDUCTION: Induction is a process where in , after studying certain facts , we reach to a conclusion.
E.g.: Socrates is a man; all men are mortal; therefore Socrates is mortal.
ABDUCTION: 'P' implies 'Q', but 'Q' may not always depend on 'P'.
E.g.: If it rains , we can't go for a picnic.
The fact that we are not in a position to go for a picnic does not mean that it is training. There can be other reasons as well.

Learning

The most important requirement for an AI system is that it should learn from its mistakes. The best way of teaching an AI system is by training & testing. Training involves teaching of basic principles involved in doing a job. Testing process is the real test of the knowledge acquired by the system wherein we give certain examples & test the intelligence of the system. Examples can be positive or negative. Negative examples are those which are 'near miss' of the positive examples.

Natural Language Processing (NLP)

NLP can be defined as:

- Processing of data in the form of natural language on the computer. I.e. making the computer understand the language a normal human being speaks.
- It deals with under structured / semi structured data formats and converting them into complete understandable data form. The reasons to process natural language are; Generally - because it is exciting and interesting, Commercially – because of sheer volume of data available online, Technically – because it eases out Computer-Human interaction.

Application Spectrum of NLP

- It provides writing and translational aids.
- Helps humans to generate Natural Language with proper spelling, grammar, style etc.
- It allows text mining i.e. information retrieval, search engines text categorization, information extraction.
- NL interface to database, web software system, and question answer explanation in an expert system.

Hurdles

There are various hurdles in the field of NLP, especially speech processing which result in increase in complexity of

the system. We know that, no two people on earth can have similar accent and pronunciations. This difference in style of communicating results in ambiguity.

Another major problem in speech processing understands of speech due to word boundary. This can be clearly understood from the following example:
I got a plate. / I got up late.

Universal Networking Language

This is a part of natural language processing. The key feature of a machine having artificial intelligence is its ability to communicate and interact with a human. The only means for communication and interaction is through language. The language being used by the machine should be understood by all humans. Example of such a language is ENGLISH.

Vision (Visibility Based Robot Path Planning)

Consider a moving robot. There are two things, robots have to think and perform while moving from one place to another:

1. Avoid collision with stationary and moving objects.
2. Find the shortest distance from source to destination.

One of the major problems is to find a collision free path amidst obstacles for a robot from its starting position to its destination. To avoid collision two things can be done viz 1) Reduce the object to be moved to a point form. 2) Give the obstacles some extra space. This method is called Mikownski method of path planning.

Neural-networks

Neural networks are computational consisting of simple nodes, called units or processing elements which are linked by weighted connections. A neural network maps input to output data in terms of its own internal connectivity. The term neural network derives from the obvious nervous system analogy of the human brain with processing elements serving as neurons and connection weights equivalent to the variable synaptic strengths. Synapses are connections between neurons - they are not physical connections, but miniscule gaps that allow electric signals to jump across from neuron to neuron. Dendrites carry the signals out to the various synapses, and the cycle repeats

Perceptron training convergence theorem

Whatever be the initial choice of the weights, the PTA will eventually converge by finding the correct weight values provided the function being trained is linearly separable.

This implies Perceptron Training Algorithm will absorb the threshold with negative weight. Σ Wi Xi + (-1) $\theta \geq 0$

Conclusion

AI combined with various techniques in neural networks, fuzzy logic and natural language processing will be able to revolutionize the future of machines and it will transform the mechanical devices helping humans into intelligent rational robots having emotions.
Expert systems like Mycin can help doctors in diagnosing patients. AI systems can also help us in making airline enquiries and bookings using speech rather than menus. Unmanned cars moving about in the city would be reality with further advancements in AI systems. Also with the advent of VLSI techniques, FPGA chips are being used in neural networks.
The future of AI in making intelligent machines looks incredible but some kind of spiritual understanding will have to be inculcated into the machines so that their decision making is governed by some principles and boundaries.

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Non-Invasive Device for Cardiac Diagnosis using Nadi Shastra

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***Abstract*— Analysis of pulse waveforms is very important for diagnosis of cardiovascular functions non-invasively. Arterial stiffness is a predictor of arteriosclerosis. Pulse Wave Velocity (PWV) is an index parameter for arterial stiffness. PWV depends on blood pressure at the measuring time. It is one of the parameter for early detection of arterial sclerosis. Cardio-ankle vascular index (CAVI) is a stiffness index and shows the artery stiffness from the region of the aorta to the region of ankle. It is not depending on blood pressure at the measuring time. Arteriosclerosis contributes to the cardiovascular disease. It shows high mortality and morbidity with respect to Arteriosclerosis. Arterial sclerosis with the coronary is evaluated by Coronary Angenography (CAG). Ultrasonography is also used for analysis of coronary artery disease. As we are dealing specially with atherosclerosis we are going to take arterial pulses and blood pressure of normal and diseased patients. As we know diabetic patients are more prone to get atherosclerosis we will try to analyse them. Analysis of 3 fingers (index, middle, and ring finger) pulse rate at different time intervals (morning , afternoon , evening) helps us to analyse the disease and develop the device for it which is inexpensive Polyvinylidene fluoride(PVDF) sensor are best sensor to get readings (Blood pressure , Pulse wave velocity).**

Keywords— **Atherosclerosis, Pulse Wave Velocity (PWV), Cardio Ankle Vascular Index (CAVI), Polyvinylidene Fluoride (PVDF)**

VI. INTRODUCTION

Ayurveda is an Indian medical science which has not received great value due to scientific recognition in modern times. Today, the development of efficient and non-invasive device required as an alternative to the recent medical sciences felt especiallyto the recent sciences of health care and research field. Currentlytraditional medical sciences are getting new thrust to treat disease.

According to Ayurveda, diagnosis is a root to find out the cause of a disease. The basis for the diagnosis and treatment under Ayurveda are natural constitutions (prakruti) in terms of the three basic principles Vata, Pitta, and Kapha. Which are collectively called Tridosha. The method of evaluating Tridosha is called as prakruti nidana. Space, Air, Fire, Water and Earth, are the five basic elements in human body, the combination of which manifest Tridosha [1]. Vata is manifested by air and space, pitta is manifested by fire and water and kapha is manifested by earth and water.In the physical body, the energy of movement(Vata), the energy of digestion and metabolism(Pitta), whereas energy that forms structure of the body(Kapha).These three doshas helps todetermine individual's constitution and contribution to the function of the body in normal condition. They contribute to the disease process when they are out of balance. Nadi-pariksha is done at the root of the thumb by examining the radial artery using three fingers. The radial pulse is usually chosen as the site to read the Nadi (pulse) because it is most convenient to read and is more readily available than other pulse sites.

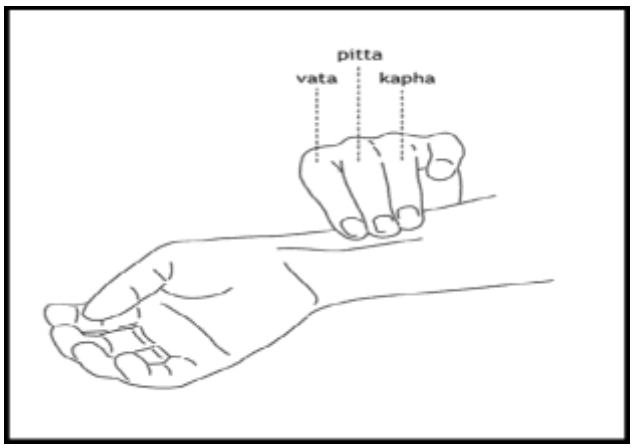

Fig. 1 Nadi- Parikshan measurement method in Ayurveda [2]

Analysis of arterial pulse waveform is important for non-invasive diagnosis of cardiovascular functions. Arteriosclerosis is a major contributor to cardiovascular disease, based on a high percentage of mortality and morbidity.

Arterial stiffness is a well-known predictor of arteriosclerotic vascular disease. It is one of the indexes of arterial stiffness with pulse wave velocity (PWV). But, it is known that pulse wave velocity depends on the blood pressure at measuring time. It is one of the parameter for early detection of atherosclerosis.Cardio-ankle vascular index (CAVI) is derived from stiffness parameter and reflects the stiffness of the artery from the origin of the aorta to the ankle as a whole. Conspicuous feature is independency from the blood pressure at measuring time.

VII. EVALUATION METHODLOGY

D. Subjects

For evaluation of cardiac disease we subjected 3 types of subjects. They are normal, disease and diabetes subjects. As we know diabetic subjects are more prone to get cardiac disease. Analysis of them helps us to understand the disease condition very well. We subjected 150 people (normal 50, diseased 50 & diabetic 50) with different ages for analysis.

E. Chemistry of Blood

Blood is bodily fluid which transports the nutrients and oxygen to the cells and transport metabolic waste from same the cells. Blood contains certain amount of lipid molecules in it for transportation process and to influence the metabolism process. Binding of this lipid molecule to each other forms the larger lipid molecule, which affect the flow of blood. Change in the blood flow affects the normal metabolism of human which results in disease. In our study we measured lipid profile of blood that is HDL, LDL, Total cholesterol and triglycerides value along with blood pressure. Analysis of lipid profile helps in determination of disease condition. In diseased and diabetic patients the lipid profile changes as compared with normal human.

TABLE I
REFERENCE LIPID PROFILE RANGE

	Desirable (mg/dl)	**Borderline (mg/dl)**	**High risk (mg/dl)**
Cholesterol	<200	200-239	240
Triglycerides	<150	150-199	200
HDL cholesterol	60	35-45	Below 40
LDL cholesterol	60-130	130-159	160-189

F. Blood Pressure

Blood pressure is the pressure of the blood in our arteries. Every individual need certain amount of pressure in our arteries to keep the blood flowing around your body. Systolic blood pressureis the highest level of blood pressure which occurs when heart contracts and blood is forced through the arteries.Diastolic blood pressureis the lowest level of blood pressure which occurs when heart relaxes between each beat.Everyone's blood pressure varies during the day. It tends to be highest in the morning and lowest at night. Change in the blood pressure is another parameter for early detection of disease condition. So in our study we measured blood pressure using sphygmomanometer in all 3 types of subjects. Normal blood pressure 120/80mmHg.Change in blood pressure is categorised as in Table no II.

TABLE III
REFERENCE BLOOD PRESSURE RANGE

Category	**Systolic (mm Hg)**	**Diastolic (mm Hg)**
Normal	120	80
Prehypertension	120 – 140	80 – 90
High blood pressure	140 – 180	90 – 110
Hypertensive crisis	Higher than 180	Higher than 110

G. Pulse Measurement

Due to the pulsatile nature of blood flow, arterial blood pressure has a characteristic waveform. The contour of this pressure wave varies throughout the body, as well as with increasing age and cardiovascular disease states.

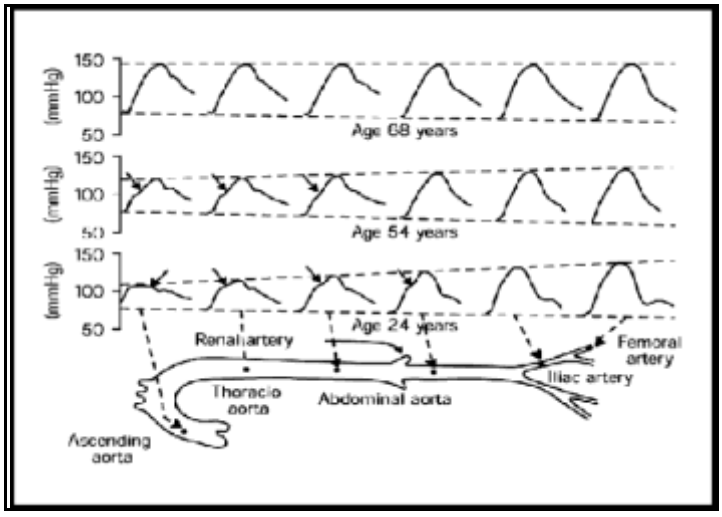

Fig. 2Typical arterial pressure waveforms according to age [3]

H. Pulse Wave Velocity Measurement

Pulse Wave Velocity is an index to assess arteriosclerosis and it is regarded as an early detector of cardiac dysfunction. Analysis of arteriosclerosis is very important to help prevention of cardiovascular diseases. The pressure pulse velocity varies over the range from about 11m/sto 15m/sin stiff peripheral arteries, where as in normal arteries it has a velocity in the range of 8 to 9m/s.

PWV measurement is based on measurement of two pulse waves at two different positions that is the radial artery at the wrist and the ankle. By determining the pulse transit time between these points & the distance measured between these

two locations, pulse wave velocity may then be calculated. The pressure pulse detection is done by using two piezoelectric sensors which generate a measurable voltage at the output contacts if they are mechanically deformed.The pulse referred to here will be the pressure pulse as opposed to the flow pulse measured by ultrasound Doppler[4].

I. Cardio Ankle Vascular Index (CAVI) Measurement

It is an arterial stiffness parameter. It has been used, as a marker, related to arteriosclerosis including the aorta, femoral artery and tibial artery. CAVI is independent of blood pressure [5].Arterial stiffness occurs in patients with hypertension, diabetes mellitus, dyslipidemias, and obesity and metabolic syndrome, conditions or disease processes that are known to be pathophysiologically linked with cardiovascular disease [6]. Based on its association with cardiovascular disease, it has beenproposed that the evaluation and monitoring of arterial stiffness may be useful for determining cardiovascular disease risk and for monitoring therapy [7]. Furthermore, no special technique is required for the measurement of CAVI. Several reports have shown the usefulness of CAVI for the detection of atherosclerotic diseases [8].

VIII. PRINCIPLE OF CAVI

Pulse wave velocity (PWV) from the heart to the ankle is obtained by measuring the length from the origin of the aorta to the ankle, and by calculating T=tb+tba. Blood pressure is measured at the brachial artery. Ps: systolic blood pressure, Pd: diastolic blood pressure, ΔP: Ps-Pd, ρ: blood density, ΔP: pulse pressure, L:length from the origin of the aorta to the ankle, T: time taken for the pulse wave to propagate from the aortic valve to the ankle, tba: time between the rise of thebrachial pulse wave and the rise of the ankle pulse wave, tb: time between aortic valve closing sound and the notch of brachial pulse wave, t'b: time between aortic valve opening sound and the rise of the brachial pulse wave[9].

CAVI is calculated using PWV from the aortic valve origin to the ankle region and blood pressure measured at the upper arm (Fig. 3). The formula for CAVI uses the Bramwell-Hill's equation, which represents the relationship between PWV and volume change [10] and is derived from the stiffness parameter β first proposed by Hayashi et.al.[11]. CAVI is calculated as follows:

$$\mathbf{CAVI = a\ \{(2\rho/\Delta P) \times \ln(Ps/Pd) \times PWV2\} + b}$$

where 'Ps' is the systolic blood pressure, 'Pd' is the diastolic blood pressure, 'PWV' is the pulse-wave velocity from the aortic origin to the ankle region via the femoral artery, 'ΔP' is Ps - Pd, 'ρ' is the blood viscosity, and 'a' and 'b' are constants for converting a CAVI value to a value obtained by Hasegawa's method [12,13].

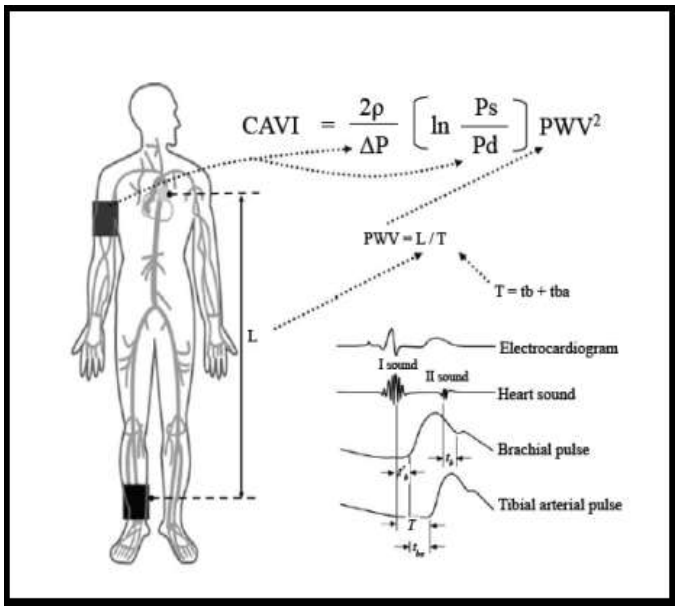

Fig. 3 CAVI Measurement

CAVI is calculated using PWV from the aortic valve origin to the ankle region and blood pressure measured at the upper arm (Fig. 3). The formula for CAVI uses the Bramwell-Hill's equation, which represents the relationship between PWV and volume change [10] and is derived from the stiffness

A. Factors that affect CAVI

Increase in CAVI is due to:

Aging, Male, Arteriosclerotic diseases Haemodialysis patients, cerebral infarction Coronary artery disease, chronic kidney diseases, Arteriosclerosis risks, Diabetes mellitus, Hypertension, Dyslipidemia Metabolic syndrome, Smoking

Decrease in CAVI is due to:

Weight reduction, Glucose control insulin, Glimepiride, Blood pressure control, ARB, CA-antagonist, Cholesterol control Statin, EPA,and Smoking cessation.

IX. ACQUIRED DATA

The below Table III systematically shows the acquired data from both normal and disease patient. And followed by it, Fig. 4, Fig.5, Fig. 6 shows the graphical representation of acquired data.

TABLE IIIII

ACQUIRED DATA

AGE	SBP	DBP	HDL	LDL	TCL	PWV	CAVI
20	148	92	41	154	225	9.6	15.64
21	122	82	47	111	117	8.8	15.38
25	129	83	81.5	72.5	134.5	5.75	6.33
26	127.33	84.66	52	91	177.66	7.266	10.09
27	133.6	83.6	56.72	99.8	179.8	7.56	10.71
28	130	84	63	112	210	7	9.30
29	131.33	85.33	54.33	130	201	6.733	8.49
30	136	86	53	108	181	7.4	10.03
31	133.33	85.33	56.33	107.06	189.33	6.966	9.02
32	142	86	54	137	219	8	11.46
33	142	88	55	133.66	193.33	7.33	9.52
34	140	88.8	53	124	198.4	7.66	10.43
35	140	88.8	45	100.8	170.2	8.78	13.70
36	132	84	42	91.33	163	9.467	16.87
37	139.5	87.5	46.75	126	201.25	8.325	12.43
38	137.33	88.66	50	96.466	180.33	8.4	12.68
39	145	91	39	137	213.5	9.75	16.40
40	143	88	54.5	125.8	204.5	7	8.65
41	134	86	60	107	180	7	9.05
42	145.5	89.5	46.75	131.15	213.25	8.4	12.24
43	135	84	46	145.9	214	9.5	16.72
44	146	90.5	46.75	162	205.25	8.775	13.27
45	136	88	48	119	208	7.8	11.03
46	146	88	42.5	13.7	180	8.6	12.91
47	158	98	36	100	153	11.2	19.97
48	129	83	40	90.5	158	9.7	18.03
49	144	86	41	142	195	8.8	13.76
50	150	93	34	125.5	209.5	11.3	21.41
51	149.33	92	34.33	129.66	209.33	10.466	18.50
55	148	94	36	103	253	10.8	19.60
56	140	94	42	120	192	9.5	15.63
57	132	84	56	82	148	6.8	8.70
58	150	94	42	134	260	9.4	14.74
59	136	88	42	99	160	9.2	15.35

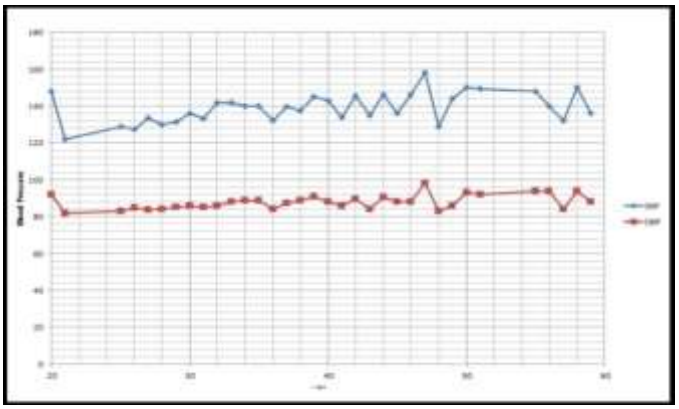

Fig. 4 shows a graph between BloodPressure and Age

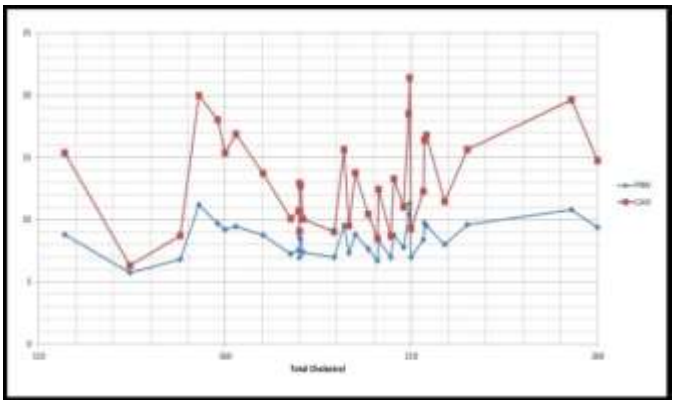

Fig. 5shows a graph between Total cholesterol (TCL),PWV & CAVI

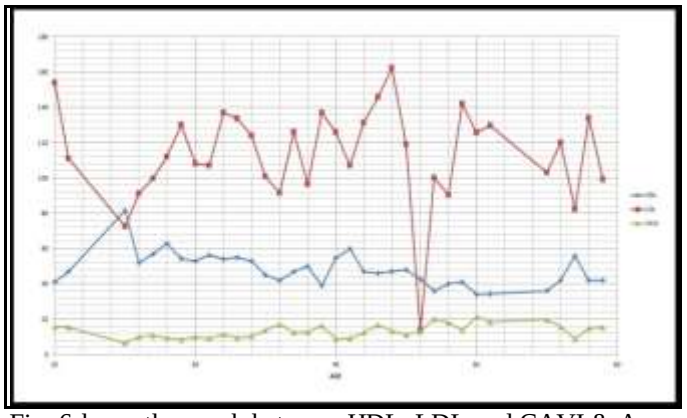

Fig. 6shows the graph between HDL, LDL,and CAVI & Age.

X. DISCUSION

Readings of 150 diseased, normal and diabetic patients are described in the Table III,were mean value of all the parameters of same age people is considered on the basis of

the acquired readings of blood pressure, cholesterol, PWV and CAVI is calculated. It is found from Fig.4 that with increase in the age of diseased patient, blood pressure levels are increasing, also the cholesterol level,i.e., the plot of HDL, LDL v/s CAVI which is plotted in Fig.6. The Fig.5 shows that with increase in cholesterol value, PWV is increasing and even CAVI value is increasing. Hence, study of CAVI can be considered as an early marker for detection of deposition of cholesterol and a device to detect Atherosclerosis can be designed on the basis of the CAVI.

XI. PROPOSED DEVICE

The basic input for the designed device will be pulse detected by the PVDF pressure sensor which would be further amplified using a precision Instrumentation amplifier by a gain of 1000. Signal processing block would include two major filters one of which would be a Band pass filter with appropriate frequency range. The second filter would be a Notch filter designed for 50Hz which is to remove the noise due to power supply. The processed signal would then be sent to DAQ Card. The sampling rate will be set to 1000 samples/second or 1000 Hz. The DAQ unit performs analog to digital conversion. Therefore, the sampled data that will be read into the LabVIEW or MATLAB will be a continuous stream of discrete data points of double precision. This data would be further processed in LabVIEW or MATLAB to detect the chances of atherosclerosis by analysing the acquired signal.

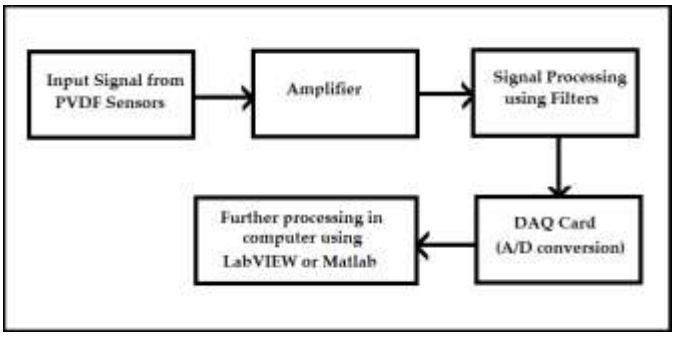

Fig. 7 Block diagram of proposed device

XII. CONCLUSION

Atherosclerosis is one of the major diseases which is caused by the abnormality in arterial pulse. The abnormality is mainly caused by development of cholesterol in artery,Smoking, diabetes, obesity. Analysis of blood pressure,pulse wave velocity and measurement cardio-ankle vascular index (CAVI) helps us to determine the disease at the early stage. As we know pulse wave velocity (PWV) and CAVI are the predictor of cardiac diseases and analysis of them is very important to detect the disease.

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Computer Assisted Navigation Surgery

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***Abstract*— Modern minimally invasive surgery has made huge advances in both technique and technology. However, the minimally invasive surgeon is still faced with daunting challenges in terms of visualization and hand-eye co-ordination. We have been developing a set of techniques for assisting surgeons in navigating and manipulating the three-dimensional space within the human body. Despite rapid developments in the research areas medical imaging, medical image processing and robotics, the use of computer assistance in surgical routine is still limited to diagnostics, surgical planning, and interventions on mostly rigid structures. In order to establish a computer aided workflow from diagnosis to surgical treatment and follow-up, several proposals for computer assisted navigation surgery interventions have been made in recent years. By means of different pre- and intraoperative information sources, like surgical planning's, intra-operative imaging, and tracking devices, surgical navigation systems aim at supporting surgeons in localizing anatomical targets, observing critical structures, and sparing healthy tissue. We concentrate on approaches which can be applied in orthopaedic surgery, ENT surgery, neurosurgery, radiosurgery, oral and maxillofacial surgery, visceral surgery has special needs for image guidance due to limitations in perception.**

***Keywords*— computeraided surgery, computer assisted intervention, image guided surgery,surgical navigation.**

I. INTRODUCTION

Computer assisted navigation surgery represents a surgical concept and set of methods, that use computer technology for pre-surgical planning, and for guiding or performing surgical interventions. Computer assisted navigation surgery is also known as computeraided surgery, computer assisted intervention, image guided surgery and surgical navigation. Computer assisted navigation surgery has been a lead in factor for the development of robotic surgery. Navigation systems track objects with precision expressed as root mean square equalling even up to 0.15 mm. Application of navigation system combined with imaging technique makes surgical operations less invasive, which results in the reduced risk of infection, smaller scar and a shorter time of rehabilitation. Imaging techniques allow surgeon to create individual virtual models for virtual surgery planning. Navigation system tracks the positions of surgical tools in relation to the patient's coordinate systems. Medical imaging enables low-invasive surgery, whereas the position of surgical instruments is monitored on screen.

II. OBJECTIVES

- To overcome the daunting challenges in terms of visualization and hand-eye co-ordination by minimally invasive surgeon
- To improve surgical accuracy, reliability and to allow the surgeons to retain ultimate control of the procedure and to avoid prolong time in the operating room

III. HISTORY

The first attempts in 3D mapping/navigation of human tissues were made by V. Horsley and R. Clarke in 1906. They have built a rectangular stereotactic headframe that had to be fixed to the head. It was based on cartesian principles and allowed them to accurately and reproductibly guide needle-like electrodes for neurophysiological experiments. They have experimented animals and were able to contribute to the mapping of the cerebellum. Improved versions of the Horsley–Clarke apparatus are still in used today in experimental neurosurgery.

The first stereotactic device for humans was also developed in neurosurgery, by E. Spiegel and H. Wycis in 1947. It was used for surgical treatment of Parkinson's disease and, during time, its applicability was extended for the surgical treatment of tumors, vascular malformations, functional neurosurgery etc. The system was based both on headframes and X-ray images taken for all three planes of space.

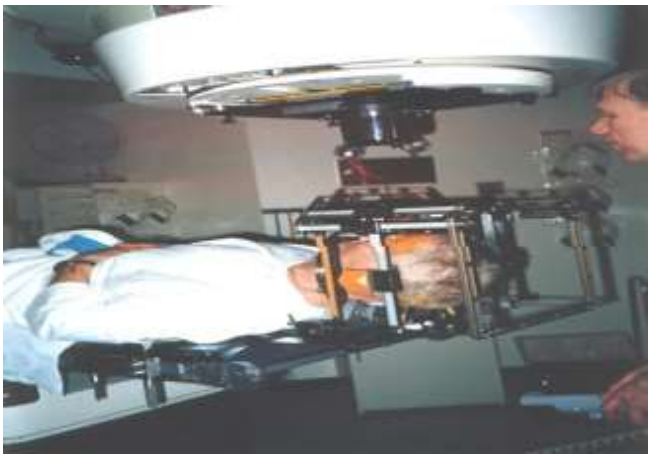

Fig. 1 Stereotactic Headframes.

Fig. 2Halo rings

Further development of stereotactic surgery was made by Brown, Roberts and Wells in 1980.They have developed a halo ring that was applied on the skull, during a CT scan and neurosurgical interventions. This method provided improved surgical guidance and was in fact the first development of computer guided surgery.

Patient image registration for the head area has developed for nearly two decades on the same principle of combining CT scans with mechanical reference devices such as headframes or halo rings. But the clinical experience showed that headgear is very uncomfortable to wear and even impossible to apply on little children, because their lack of cooperation; furthermore, the headframes can create artifacts in preoperative data gathering, or during surgery.

IV. METHODOLOGY

A. *General Principles*

1) Creating A Virtual Image Of The Patient:

The most important component for Computer assisted navigation surgery is the development of an accurate model of the patient. This can be conducted through a number of medical imaging technologies including CT, MRI, x-rays, ultrasound plus many more. For the generation of this model, the anatomical region to be operated has to be scanned and uploaded into the computer system. It is possible to employ a number of scanning methods, with the datasets combined through data fusion techniques. The final objective is the creation of a 3D dataset that reproduces the exact geometrical situation of the normal and pathological tissues and structures of that region. Of the available scanning methods, the CT is preferred, because MRI data sets are known to have volumetric deformations that may lead to inaccuracies. An example data set can include the collection of data compiled with 180 CT slices that are 1 mm apart, each having 512 by 512 pixels. The contrasts of the 3D dataset (with its tens of millions of pixels) provide the detail of soft vs. hard tissue structures, and thus allow a computer to differentiate, and visually separate for a human, the different tissues and structures. The image data taken from a patient will often include intentional landmark features, in order to be able to later realign the virtual dataset against the actual patient during surgery. See patient registration.

2) Image Analysis And Processing:

Image analysis involves the manipulation of the patient's 3D model to extract relevant information from the data. Using the differing contrast levels of the different tissues within the imagery, as examples, a model can be changed to show just hard structures such as bone, or view the flow of arteries and veins through the brain.

3) Diagnostic, Preoperative Planning, Surgical Simulation:

Using specialized software the gathered dataset can be rendered as a virtual 3D model of the patient, this model can be easily manipulated by a surgeon to provide views from any angle and at any depth within the volume. Thus the surgeon can better assess the case and establish a more accurate diagnostic. Furthermore, the surgical intervention will be planned and simulated virtually, before actual surgery takes place. Using dedicated software, the surgical robot will be programmed to carry out the pre-planned actions during the actual surgical intervention.

4) Surgical Navigation:

In computer-assisted surgery, the actual intervention is defined as surgical navigation. Using the surgical navigation system, the surgeon will use special instruments, which are connected to the navigation system to touch an anatomical position on the patient. This position is simultaneously shown in the images taken from this patient. The surgeon can thus use the instrument to 'navigate' the images of the patient by moving the instrument.

5) Robotic Surgery:

Robotic surgery is a term used for correlated actions of a surgeon and a surgical robot (that has been programmed to carry out certain actions during the preoperative planning procedure). A surgical robot is a mechanical device (generally looking like a robotic arm) that is computer controlled. Robotic surgery can be divided into three types, depending on the degree of surgeon interaction during the procedure: supervisory-controlled, telesurgical, and shared-control. In a supervisory-controlled system, the procedure is executed solely by the robot, which will perform the pre-programmed actions. A telesurgical system, also known as remote surgery, requires the surgeon to manipulate the robotic arms during the procedure rather than allowing the robotic arms to work from a predetermined program. With shared-control systems, the surgeon carries out the procedure with the use of a robot that offers steady-hand manipulations of the instrument. In most robots, the working mode can be chosen for each separate

intervention, depending on the surgical complexity and the particularities of the case.

V. SYSTEMS AND METHODS

1) Navigation System:

Fig. 1 shows the configuration of the navigation system. The system consists of an image acquisition device (CT or MRI), optical position tracking device and main PC for data segmentation, communication and other computational tasks. The patient is scanned by X ray CT or MRI and 3D voxel data is sent to the main PC through RS232C. The data is then segmented and reconstructed as a 3D surface model. Patient to image registration is done prior to the operation. During the operation, the tracking device reads the positions of optical markers on the surgical tool and sends them to the main PC where the tool's orientation and the position of its tip are computed so that surgeons can know its correct position during operation. These processes are all controlled by the 3D Slicer module. Another module separately handles the IV rendering so that the IV image can be updated as the surgeons manipulate the surface model.

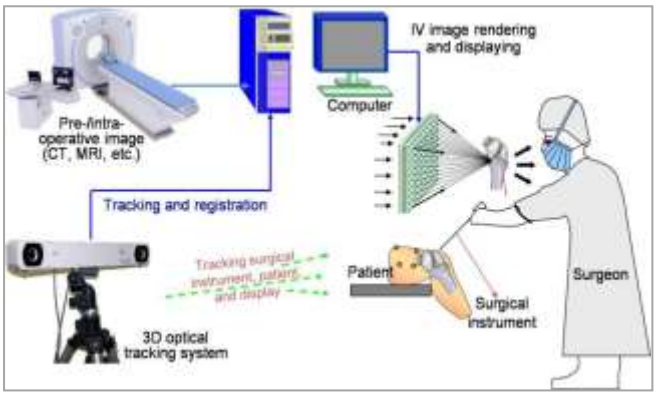

Fig. 3 System configuration.

2) Flow Of Surgery:

Prior to the operation, a 3D model to be used for navigation is created from the CT data. Objects of interest are segmented from the data set on the basis of the pixels' values. Depending on the complexity of the object interest, the segmentation can be done automatically or semi-automatically. At this point, surgeons can locate the target or critical tissues (vessels, nerves) and plan the surgical path to avoid those parts. The next task is to register the 3D model to the patient, which is called patient-to-image registration. The most common way to do this is to plant markers directly on the patient's body and perform multi-point registration. This method is effective but planting a marker on patient increases the invasive aspect of the surgery. Here, we shall assume that a minimally invasive registration method is to be used. By recording a set of surface data and comparing it with the surface model, patient-to-image registration can be done accurately and less invasively. During the operation, images are displayed on normal and IV displays. Although the 3D structure is properly reproduced in the IV images, we still need a normal display for other information such as the distance to the target and the current position and orientation of the tool. Furthermore, the spatial resolution of the IV image is limited, and small tissues might be properly visualized. For that reason, we built a synchronized display system that simultaneously displays normal and IV images.

3) Patient-Image Registration:

When the registration tool's tip touches the bone surface, 3D information about the surface is acquired and compared with the 3D surface model of the bone. A registration matrix between the two surfaces is computed using iteration closest point (ICP) algorithm developed by Besl and Mckay after the initial registration is done. After the transformation, the positional relation between the bone and surgical tool will be accurate enough so that surgeons can know the correct position of the tool during the operation.

Patient registrationis the concept and set of methods needed to correlate the reference position of a virtual 3D dataset gathered by computer medical imaging with the reference position of the patient. This procedure is crucial in computer assisted surgery, in order to insure the reproducitibility of the preoperative registration and the clinical situation during surgery. The use of the term "patient registration" out of this context can lead to confusion with the procedure of registering a patient into the files of a medical institution.

i. *How Patient Image Registration Is Performed?:* In computer assisted surgery, the first step is to gather a 3D dataset that reproduces with great accuracy the geometry of the normal and pathological tissues in the region that has to be operated on. This is mainly obtained by using CT or MRI scans of that region. The role of patient registration is to obtain a close-to-ideal reference reproducitibility of the dataset – in order to correlate the position (offset) of the gathered dataset with the patient's position during the surgical intervention.

Patient registration,

- Eliminates the necessity of maintaining the same strict position of the patient during both preoperative scanning and surgery
- Provides the surgical robot the necessary reference information to act accurately on the patient, even if he has (been) moved during the intervention

4) 3d-Integral Videography

IV records and reproduces 3-D images by using a micro convex lens array and a high-pixel-density flat display, e.g., an LCD display. This display is usually placed at the focal plane of the lens array so that light rays from the corresponding pixels will converge and form a single dot in physical space (Fig. 3). Many types of data can be processed to produce IV images of 3D objects. Here, we discuss the two

main methods of making IV, the volume ray-casting method and the pixel distribution method.

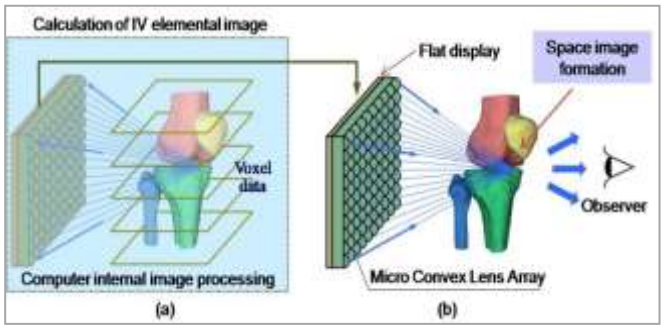

Fig. 4. Principle of integral videography;
(a) Computer generated elemental images. (b) IV image spatial formation.

The volume ray-casting method directly processes the volume data (CT, MRI, US). It is basically an extended volume rendering method in which a light ray must go through a micro lens before intersecting with the screen.

The pixel distribution method constructs an IV image from a set of multi-view images acquired by geometrically based surface rendering. This method processes CG surface models, and therefore, it can produce high-quality images with manyvisual effects. In addition, peripheral devices such as surgical tools can be visualized in the IV image as a simple CG model. For these reasons, our system uses pixel distribution as the primary method for rendering IV images.

VI. APPLICATIONS

Computer assisted surgery is the beginning of a revolution in surgery. It already makes a great difference in high precision surgical domains, but it is also used in standard surgical procedures.

1) Computer Assisted Orthopaedic Surgery (Caos)

The application of robotic surgery is widespread in orthopaedics, especially in routine interventions, like total hip replacement. It is also useful in pre-planning and guiding the correct anatomical position of displaced bone fragments in fractures, allowing a good fixation by osteosynthesis. Early CAOS systems include the HipNav, OrthoPilot, and Praxim.Computer-assisted orthopaedic surgeryis a discipline where computer technology is applied pre-, intra- and/or post-operatively to improve the outcome of orthopedic surgical procedures. CAOS is an active research discipline which brings together orthopaedic practitioners with traditionally technical disciplines, such as engineering, computer science and robotics. The principal idea behind CAOS is that operative outcomes will be improved through the use of computer technology. Taking the example of joint replacement, the task of the surgeon is to integrate the new joint components into the patient's existing anatomy; CAOS technologies allow the surgeon to:-

• Plan the component placement in advance, including determination of the appropriate component sizes.
• Measure the intra-operative placement of the components in real time, making sure that the plan is adhered to.
• Measure the post-operative result.

It has not yet been proved that CAOS technologies result in a significant long-term improvement in operative outcome. Whilst the surgeon (or even medical students in laboratory studies) can achieve better results in terms of planned vs. achieved placement of components, it is not clear whether the plan has been constructed optimally.

Further, because of the functional adaptability of bone, errors in component placement may become unimportant in the long term. Because of the relatively short time period over which CAOS has developed, long-term follow-up studies have not yet been possible. With CAOS, the surgeon can more accurately pinpoint anatomical landmarks that might be hard to see in a small incision. This navigation system then guides the surgeon through different bone cuts and finally to implantation. Computer-assisted orthopaedic surgery is mostly used in knee implant surgery because of the precision the surgeon gets with femoral and tibial bone cuts. It is also used to navigate acetabular components placement where correct cup inclination is crucial. Computer-assisted orthopaedic surgery is a system where a computer interacts with body parts via infrared lights and gate detectors. There are systems that require C-Arm images or CAT scans and the newest and most evolved systems are imageless systems, this means that no pre scans of any kind are necessary. The imageless systems are far less complicated, are lower cost and more patient friendly since the pre scans are not necessary. The imageless systems will also bring down operation time. The negative aspect of imageless systems is that they might be less accurate.

2) 5.2 Computer Assisted Neurosurgery

Tele-manipulators have been used for the first time in neurosurgery, in the 1980s. This allowed a greater development in brain microsurgery, increased accuracy and precision of the intervention. It also opened a new gate to minimally invasive brain surgery, furthermore reducing the risk of post-surgical morbidity by accidentally damaging adjacent centres.

3) Computer Assisted Oral And Maxillofacial Surgery

Bone segment navigation is the modern surgical approach in orthognathic surgery (correction of the anomalies of the jaws and skull), in temporo-mandibular joint (TMJ) surgery, or in the reconstruction of the mid-face and orbit. It is also used in implantology where the available bone can be seen and the position, angulation and depth of the implants can be

simulated before the surgery. During the operation surgeon is guided visually and by sound alerts. IGI (Image Guided Implantology) is one of the navigation systems which use this technology.

4) Computer Assisted Ent Surgery

Image-guided surgery and computer assisted navigation surgery in ENT commonly consists of navigating preoperative image data such as CT or cone beam CT to assist with locating or avoiding anatomically important regions such as the optical nerve or the opening to the frontal sinuses. For use in middle-ear surgery there has been some application of robotic surgery due to the requirement for high-precision actions.

5) Computer Assisted Visceral Surgery

With the advent of Computer assisted surgery, great progresses have been made in general surgery towards minimal invasive approaches. Laparoscopy in abdominal and gynecologic surgery is one of the beneficiaries, allowing surgical robots to perform routine operations, like colecystectomies, or even hysterectomies. In cardiac surgery, shared control systems can perform mitral valve replacement or ventricular pacing by small thoracotomies. In urology, surgical robots contributed in laparoscopic approaches for pyeloplasty or nephrectomy or prostatic interventions.

6) Computer Assisted Radiosurgery

Radiosurgery is also incorporating advanced robotic systems. CyberKnife is such a system that has a lightweight linear accelerator mounted on the robotic arm. It is guided towards tumor processes, using the skeletal structures as a reference system (Stereotactic Radiosurgery System). During the procedure, real time X-ray is used to accurately
position the device before delivering radiation beam.

VII. ADVANTAGES

- The surgeon can easily assess most of the surgical difficulties and risks and have a clear idea about how to optimize the surgical approach and decrease surgical morbidity.
- During the operation, the computer guidance improves the geometrical accuracy of the surgical gestures and also reduces the redundancy of the surgeon's acts. This significantly improves ergonomics in the operating theatre, decreases the risk of surgical errors and reduces the operating time.
- It enhance surgeon's capability to carry out various "minimally invasive" surgical procedures.
- Faster, easier and steadier surgery.
- More accurate.
- Enhanced visualisation.
- Less pain to patient.
- Shorter recovery time.
- Shorter hospital stays.

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Advanced Wireless Communication

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***Abstract*— 4G is the next generation of wireless networks that will totally replace 3G networks. It is supposed to provide its customers with better speed and all IP based multimedia services. 4G is all about an integrated, global network that will be able to provide a comprehensive IP solution where voice, data and streamed multimedia can be given to users on an "Anytime, Anywhere" basis. 4G presents a solution of this problem as it is all about seamlessly integrating the terminals, networks and applications. Wi-Fi is a kind of new technology about wireless broadband access. Compared with conventional wireless technologies, it has faster speed, wider range and better security.**

In this paper, the concepts and characteristics of Wi- Fi are introduced and to highlight the benefits, challenges in deployment and scope of 4G technologies.

***Keywords*—4G mobile communication, CRE, Internet telephony, CDMA, FDMA, packet radio networks, TDMA, Ad-hoc, Infrastructure, W- LAN, Wi-Fi, Construction of the network.**

I. INTRODUCTION

The major expectation from the fourth generation (4G) of wireless communication networks is to be able to handle much higher data rates which will be in the range of 1Gbits in WLAN environment and 100Mbits in cellular networks [1]. A user, with large range of mobility, will access the network and will be able to seamlessly reconnect to different networks even within the same session. The spectra

Allocation is expected to be more flexible and even flexible spectra shearing among the different sub networks is anticipated. In such, so called composite radio environment (CRE), there will be need for more adaptive and reconfigurable solutions on all layers in the network. In other words there will be need for adaptive link, MAC [6], network and TCP layer including cross layer optimization. This also refers to mobility management and adaptive radio resource management. The composite radio environment will include presence of WLAN, cellular mobile networks, digital audioand video broadcasting, satellite, mobile ad hoc and Sensor networks. Within the more advanced solutions focus will be on active networks [2],[3] including programmable networks, [7],[8] evolution to 4G wireless networks, programmable 4G mobile network architecture, cognitive packet networks, the random neural networks based algorithms, game theory models in cognitive radio networks, cognitive radionetworks as a game and biologically inspired networks including bionet architectures [9]. The networks management will deal with topics such as self-organization in 4G networks, mobile agent based network management [4], mobile agent platform, mobile agents in multi-operator networks, integration of routing algorithm and mobile agents and ad hoc network management. The network information theory [10],[11] has become an important segment of the research dealing with effective and transport capacity of advanced cellular network, capacity of ad hoc networks, information theory and network architectures, cooperative transmission in wireless multi-hop ad hoc networks, network coding, capacity of wireless networks using MIMO technology and capacity of sensor networks with many to one transmissions. In addition, energy efficient wireless networks and QoS management will be also in the focus of research.

II. 4G NETWORKS AND COMPOSITE RADIO ENVIRONMENT

In the wireless communications community we are witnessing more and more the existence of the compositeradio environment (CRE)and as a consequence the need for *Reconfigurability* concepts. The CRE assumes that different radio networks can be cooperating components in a heterogeneous wireless access infrastructure, through which network providers can more efficiently achieve the required capacity and QoS levels. Reconfigurability enables terminals and network elements to dynamically select and adapt to the most appropriate radio access technologies for handling conditions encountered in specific service area regions and time zones of the day. Both

Concepts pose new requirements on the management of wireless systems. Nowadays, multiplicities of radio access technology (RAT) standards are used in wireless communications. As shown in Fig. 1, these technologies can be roughly categorized into four sets:

Cellular networks that include second generation (2G) mobile systems, such as Global system for Mobile Communications (GSM) [6], and their evolutions, often called 2.5G systems, such asenhanced digital GSM evolution (EDGE), General Packet Radio Service (GPRS) [3] and IS 136 in US. These systems are based on TDMA technology. Third-generation (3G) mobile networks, known as Universal MobileTelecommunications Systems (UMTS) (WCDMA and cdma2000) [6] are based on CDMAtechnology that providesup to 2Mbit/s. In these networks 4G solutions are expected to provide up to 100 Mbit/s. The solutions will be based on combination of multicarrier (including MC CDMA) and space time signal formats. The network architectures include macro, micro and Pico cellular networks and home (HAN) and personal aria networks (PAN). Short range communications will be using ultra wid band (UWB) communications.

Broadband radio access networks (BRANs) or wireless local area networks (WLANs), which are expected to provide up to 1Gbit/s in 4G. These technologies are based on OFDMA and space time coding

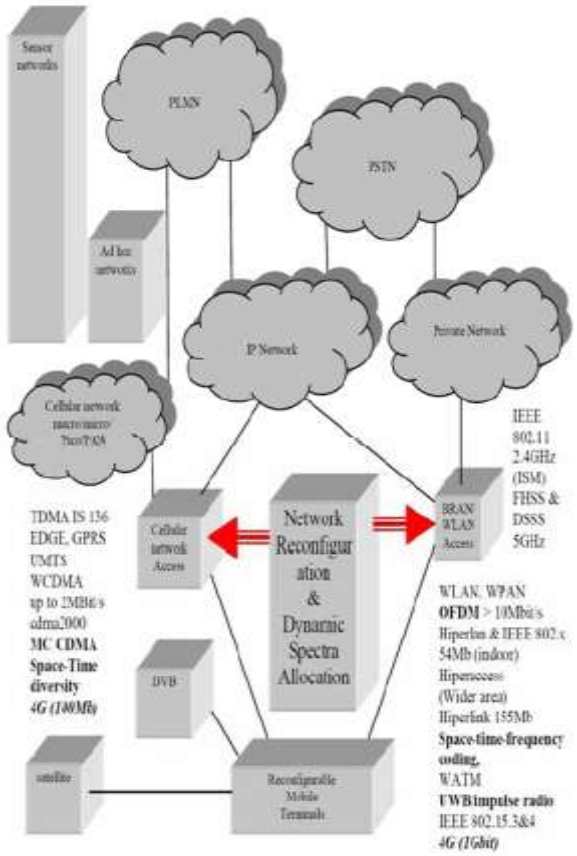

Fig. 1 Composite radio environment in 4G networks

Digital voice and video broadcasting (DVB) [5] and satellite communications will be suing OFDMA signaling formats.Ad hoc and sensor networks with emerging applications. Although 4G is open for new multiple access schemes, the CRE concept remains attractive for increasing the service provision efficiency and the exploitation possibilities of the available RATs. The main assumption is that the different radionetworks, GPRS, UMTS, BRAN/WLAN, DVB, and so on, can be components of a heterogeneous wireless access infrastructure. Anetwork provider (NP) can ownseveralcomponents of the CR infrastructure (in otherwords, canown licenses for deploying and operating different RATs), and can also cooperate with affiliated NPs. In any case, an NP can rely on several alternate radio networks andtechnologies, for achieving the required capacity and quality of service (QoS) levels, in a cost-efficient manner. Users are directed to the most appropriate radio networks and technologies, at different service area regions and time zones of the day, based on profile requirements and network performance criteria. The management system in each network manages a specific radio technology; however, the platforms can cooperate. The fixed (core and backbone) network will consists of public and private segments based on IPv4 and IPv6-based infrastructure. Mobile IP (MIP) will enable the maintenance of IP-level connectivity regardless of the likely changes in the underlying radio technologies used that will be imposed by the CRE concept.

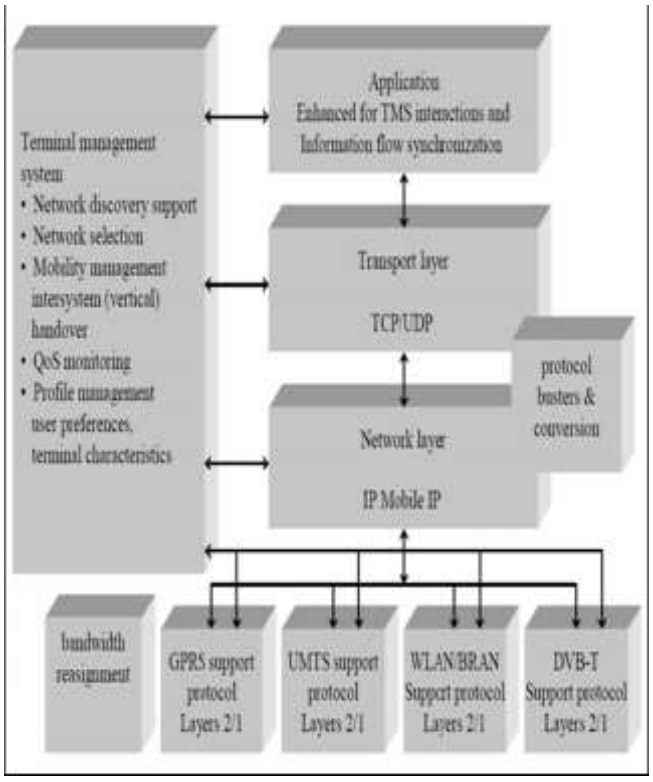

Fig. 2 depicts the architecture of a terminal that isCapable of operating in a CRE context.

The terminals include software and hardware components (layer 1 and 2 functionalities) for operating with different systems. The higher protocol layers, in accordance with their peer entities in the network, support continuous access to IP-based applications. Different protocol boosters can further enhance the efficiency of the protocol stack. Most communications networks are subject to time and regional variations in traffic demands, which lead to variations in the degree to which the spectrum is utilized. Therefore, a service's radio spectrum can be underused at certain times or geographical areas, while another service may experience a shortage at the same time/place. Given the high economic value placed on the radio spectrum and the importance of spectrum efficiency, it is clear that wastage of radio spectrum must be avoided. These issues provide the motivation for a scheme called dynamic spectrum allocation(DSA), whichaims to manage the spectrum utilized by a converged radio system and share it between participating radio networks over space and time to increase overall spectrum efficiency as shown in Fig. 3.

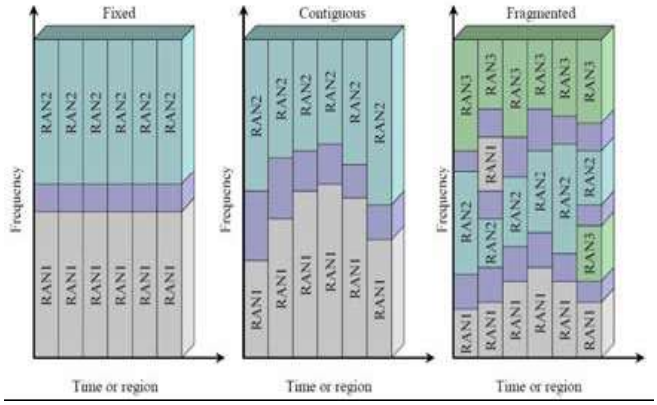

Fig. 3Architecture of a terminal that operates in a composite radio environment

Composite radio systems and reconfigurability, discussed above, are potential enablers of DSA systems. Composite radio systems allow seamless delivery of services through the most appropriate access network, and close network cooperation can facilitate the sharing not only of services, but also of spectrum. Figure3. Fixed spectrum allocation compared to contiguous and fragmented DSA.

III. PROTOCOL BOOSTERS

As pointed out in Fig. 2, elements of the reconfiguration in 4G networks are protocol boosters.A protocol booster is a software or hardware module that transparently improves protocol performance. The booster can reside anywhere in the network or end systems, and may operate independently (one-element booster), or in cooperation with other protocol boosters (multi-element booster). Protocol boosters provide an architectural alternative to existing protocol adaptation techniques, such as protocol conversion.

A protocol booster is a supporting agent that by itself is not a protocol. It may add, delete, or delay protocol messages, but never originates, terminates, or converts that protocol. A multi-element protocol booster may define new protocol messagesto exchange among themselves, but these protocols are originated and terminated by protocol booster elements, and are not visible or meaningful external to the booster.

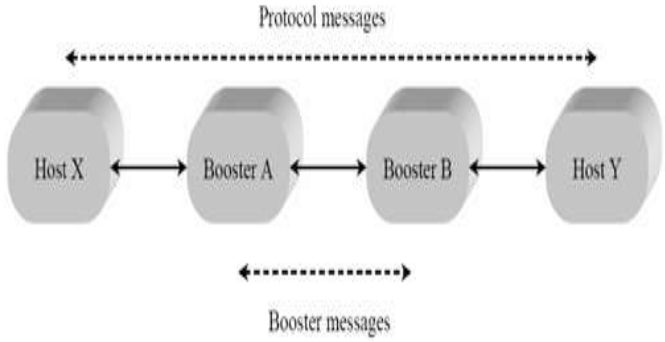

Fig. 4 shows the information flow in a generic two element booster.

A protocol booster is transparent to the protocol being boosted. Thus, the elimination of a protocol booster will not prevent end-to-end communication, as would, for example, the removal of one end of a conversion (e.g., TCP/IP header compression unit [5]. In what follows we will present examples of protocol boosters.

IV. WI-FI (WIRELESS FIDELITY)

Wireless Technology is an alternative to Wired Technology, which is commonly used, for connecting devices in wireless mode. Wi-Fi (Wireless Fidelity) is a generic term that refers to the IEEE 802.11 communications standard for Wireless Local Area Networks (WLANs).Wi-Fi Network connects computers to each other, to the internet and to the wired network.

The Wi-Fi was invented in 1991 by NCR Corporation with speed 1Mb\s -2Mb\s.
Vic Hayes has been named as father of Wi-Fi.
Europe leads Wireless phone technology. U.S. Lead in Wi-Fi systems.

A. Wi-Fi: How it works

The typical Wi-Fi setup contains one or more Access Points (APs) and one or more cliets. An AP broadcasts its SSID (Service Set Identifier, "Network name") via packets that are called beacons, which are broadcast every 100 ms. The beacons are transmitted at 1 Mbit/s, and are of relatively short duration and therefore do not have a significant influence on performance. Since 1 Mbit/s is the lowest rate of Wi-Fi it assures that the client who receives the beacon can communicate at least 1 Mbit/s. based on the settings (e.g. the SSID), the client may decide whether to connect to an AP. Also the firmware running on the client Wi-Fi card is of influence. Say two APs of the same SSID are in range of the client, the firmware may decide based on signal strength to which of the two

APs it will connect. The Wi-Fi standard leaves connection criteria and roaming totally open to the client. This is strength of Wi-Fi, but also means that one wireless adapter may perform substantially better than the other. Since Wi-Fi transmits in the air, it has the same properties as a non-switched ethernet network. Even collisions can therefore appear like in non-switched ethernet LAN's. Channels Except for 802.11a, which operates at 5 GHz, Wi-Fi uses the spectrum near 2.4 GHz, which is standardized and unlicensed by international agreement although the exact frequency allocations vary slightly in different parts of the world, as does maximum permitted power. However, channel numbers are standardized by frequency throughout the world, so authorized frequencies can be identified by channel numbers. The frequencies for 802.11 b/g span 2.400 GHz to 2.487 GHz. Each channel is 22 MHz wide and 5 MHz spacers between the channels are required. With the required spacers, only 3 channels (1,6, and 11) can be used simultaneously without interference.

B. Examples of Standard Wi-Fi Devices

1) Wireless Access Point (WAP):

A wireless access point (AP) connects a group of wireless stations to an adjacent wired local area network (LAN). An access point is similar to an ethernet hub, but instead of relaying LAN data only to other LAN stations, an access point can relay wireless data to all other compatible wireless devices as well as to a single (usually) connected LAN device, in most cases an ethernet hub or switch, allowing wireless devices to communicate with any other device on the LAN.

2) Wireless Routers:

A wireless router integrates a wireless access point with an ethernet switch and an ethernet router. The integrated switch connects the integrated access point and the integrated ethernet router internally, and allows for external wired ethernet LAN devices to be connected as well as a (usually) single WAN device such as a cable modem or DSL modem. A wireless router advantageously allows all three devices (mainly the access point and router) to be configured through one central configuration utility, usually through an integrated web server. However one disadvantage is that one may not decouple the access point so that it may be used elsewhere.

3) Wireless Ethernet Bridge:

A wireless Ethernet bridge connects a wired network to a wireless network. This is different pointfrom an accessin the sense that an access point connects wirelessdevices to awired network at the data-link layer. Two wireless bridges may be used to connect two wired networks over a wireless link, useful in situations where a wired connection may be unavailable, such as between two separate homes.

4) Range Extender:

A wireless range extender (or wireless repeater) can increase the range of an existing wireless network by being strategically placed in locations where a wireless signal is sufficiently strong and near by locations that have poor to no signal strength. An example location would be at the corner of an L shaped corridor, where the access point is at the end of one leg and a strong signal is desired at the end of the other leg. Another example would be 75% of the way between the access point and the edge of its useable signal. This would effectively increase the range by 75%.

5) Wi-Fi vs. cellular:

Some argue that Wi-Fi and related consumer technologies hold the key to replacing cellular telephone networks such as GSM. Some obstacles to this happening in the near future are missing roaming and authentication features (see 802.1x, SIM cards and RADIUS), the narrowness of the available spectrum and the limited range of Wi-Fi. It is more likely that WiMax will compete with other cellular phone protocols such as GSM, UMTS or CDMA. However, Wi-Fi is ideal for VoIP applications e.g. in a corporate LAN or SOHO environment. Early adopters were already available in the late '90s, though not until 2005 did the market explodes. Companies such as Zyxel, UT Starcomm, Sony, Samsung, Hitachi and many more are offering VoIP Wi-Fi phones for reasonable prices

MEDICAL APPLICATION OF ADVANCED WIRELESS COMMUNICATION

A. Wi-Fi

These unlicensed technologies are commonly used with cell phones, handheld devices and personal computers, but can also be used for implanted or body-worn medical devices. These devices operate in the 902-928, 2400-2483.5 and 5725-5850 MHz bands at distances up to a few hundred feet.

B. Patient Monitoring System

Repeated or continuous observations or measurements of the patient, his or her physiological function, and the function of life support equipment, for the purpose of guiding management decisions, including when to maketherapeutic interventions, and assessment of those interventions.

C. Army Building 4G CommunicationSystem For Wounded Warrior Care

Medics are often faced with wounded soldiers that need immediate attention that only a trained surgeon can help with. Moreover, once the surgeon finally gets his hands on the patient, knowing the background of the injury and the subsequent medical details can dramatically speed up initialization of proper care. Additionally, triaging multiple injuries in the field by deciding who gets the medevac first can be improved if doctors at the hospital have a good sense of what the status of the wounded is.

The Army is working on a system that can manage patient data from injury site to recovery, including providing live audio/video communication for medics in the field. The system relies on a number of devices and 4G cellular networking to send vitals to and communicate with the doctor while everything is being recorded for further review. Surely a similar system can be translated for use for civilian care and integrated into ambulances and clinics.

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System with Real Time Clock PWM Based Power Line Variation.

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Abstract:

Now a days we facing very critical situation for electricity in form of load shading therefore we must need to save power as much as possible but the question is how to do it without changing the daily needs the answer is use as much energy as we need for the situation.

Like nearly all dimmer circuits, the project describe here relies on phase angle control of the alternating voltage applied to the lamp. The process not only improves the life expectancy of the lamp, but also prevents unnecessary electromagnetic pollution in the direct vicinity of the dimmer. To be able to dim a lamp using phase angle control, it is necessary from the circuit to detect when the instantaneous level of the mains voltage equals zero volts.

Wastage of power is not desirable in any system. So it is very much economic to have this arrangement so that power is not wastage during day time where manual operation possible.

Key words: AVR micro controller, Graphic LCD, RTC, Regulator IC 7805, ZCD IC MOC3021.

Introduction:

Now a day we are facing very critical situation for electricity in the form of load shading we observe that supply of electricity is not sufficient to satisfy the growing demand. In small town, there is load shading for 2 – 3 hours. But in rural areas situation more critical. People in villages face load shading for at least 8 – 9 hours. Another 10 – 15 years will be required to generate enough power to match the demand of electricity.

So the only option we are left with is to save the power we are going to save the power by varying the intensity of light. So by implementing this process we can save a large amount of power and hence problem like load shading which is becoming critical day by day can be solved.

Objective:

- To make an innovative project this can save maximum amount of power.
- To make a system that can control devices automatically.
- To over the limitations of LDR and temperature sensors.
- To built a system which can be easily handled.
- To develop a smart project this can control intensity with respect to time.

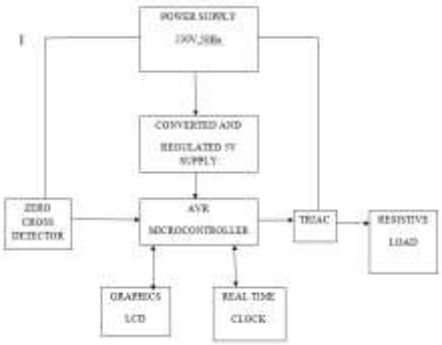
Background study:

In country such as France, Germany, Belgium, UK and northern part of the US, street lights are burning and average of 4000 hours per year. Considering that the average wattage of the lamp is around 50 watts, considering that a 100000 inhabitant city contains about 18000 lamps such a city spend around 11 Giga watt hours. Considering that producing 1 kWh implies the emission of 340 grams of CO_2, [1] the street lights of such a city are responsible for the emission of 3700 tons of CO_2 in the atmosphere per year.

Technologies and techniques now exist to:

- Save electricity with outing impacting the lighting level perceived by citizen.
- Automatically identify 99% of lamp and blast failure, saving on maintenance cost and increasing security.

Block diagram and working:



The block diagram comprises of power supply, an AVR micro controller which is the heart of the circuit; it control the operation of all the blocks, a zero cross detector, Triac, LCD, Real Time Clock, an

emergency light. A 230 volt 50 Hz power supply is connected to blocks.

A 230 volt power supply is converted into 5 volt DC supply which is used for supplying the micro controller. The conversion is done with the help of a step down transformer which brings down the 230 volts to 12 volt [2]. Now to convert this 12 volt AC into DC, we are using a rectifier circuit; further a capacitor is used to remove ripples. Now a constant 5 volt DC supply is obtained using regulator IC.

The power supply is connected to the ZCD (zero crossing detectors) as shown in the block diagram. It is a circuit that detects the zero cross of the input AC supply. The micro controller is

Connected to the zero crossing detector, the micro controller, with the help of ZCD generates PWM (pulse width modulation), which is used for varying the intensity [3].

The micro controller is also connected to a real time clock and a LCD. The function of real time clock is to obtain real time. The LCD connected which shows different modes. The modes comprises of different intensity at different time as shown in the table below:

Modes	Time	Intensity
1	6 pm to 9 pm	80 %
2	9 pm to 1 am	100%
3	1 am to 4 am	60%
4	4 am to 6 am	30%

Future Scope:

This project is helpful in bringing down load shading, and if further progresses are made in the project, it can be used for automation in industries.

Software code can be made more efficient by including the condition for cloudy atmosphere and situation in which brightness drop down during day time.

Manual setting of modes will not be required if code for varying day and night lengths during season change is included in software code.

This project can be implemented by using GSM module and modes can be set by sending SMS through cellular phone.

Conclusion:

This project is very efficient in saving power. Use of Triac results in fast switching. This project has greater flexibility as different modes are set for different time period. As per the requirement modes can be adjusted. Whole project is automatic so, no supervision is required. AC power is controlled successfully. In case of power failure, RTC takes care of time and corresponding modes. So this project is efficient and , cheap and maintenance free.

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Wheelchairs for the Handicapped Based On Artificial Intelligence

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***Abstract*— A brief survey of research in the development of autonomy in wheelchairs is presented and to build a series of intelligent autonomous wheelchairs is discussed. A standardized autonomy management system that can be installed on readily available power chairs which havebeenwell-engineered over the years has been developed and tested. A behaviour-based approach wasused to establish sufficient on-board autonomy at minimal cost and material usage, while achievinghigh efficiency, sufficient safety, transparency in appearance, and extendability. So far, the add-onsystem has been installed and tried on two common power wheelchair models.**

Keywords— **Wheelchairs, Handicapped chairs, handy cycles.**

I. INTRODUCTION

Improving life style of the physically challenged people to a great extent. In recent times there have been a wide range of assistive and guidance systems available in Wheelchair to make their life less complicated. In recent times there have been various control systems developing specialized for people with various disorders and disabilities. The systems that are developed are highly competitive in replacing the old traditional systems. There are many assistive systems using visual aids like Smart Wheelchair systems, Using Joystick and much more. There are even systems based on voice recognition too. The basic assisting using voice control is to detect basic commands using joystick or tactile screen. These applications are quite popular among people with limited upper body motility. There are certain drawbacks in these systems. They cannot be used by people of higher disability because they require fine and accurate control which is most of the time not possible. This paper reports the preliminary work in developing a wheelchair system that involves the movement of Head in directing the wheel chair. The system enables the patient to have command over the Wheelchair its direction of movement and will also sense the user about the obstacles in the path to avoid collision. This wheelchair helps the user to move in environments with ramps and doorways of little space. This work is based on previous research in wheelchairs must be highly interactive to enable the system to work most efficiently [5].

With the accelerated rate of aging of the population being reported in many post-industrial countries, demand for more robotic assistive systems for people with physical ailments or loss of mental control is expected to increase. This is a seemingly major application area of service robots in the near future. For the past six years, we have been developing a range of autonomous mobile robots and their software using the behaviour-based approach. In our experience the behaviour-based approach allows developers to generate robot motions which are more appropriate for use in assistive technology than traditional Cartesian intelligent robotic approaches. In Cartesian robotics, on which most conventional approaches to intelligent robotics are based, "recognition" of the environment, followed by planning for the generation of motion sequence and calculation of kinematics and dynamics for each planned motion, occupy the centre of boththeoretical interest and practice. By adopting a behaviour-based approach wheelchairs can be built which can operate daily in complex real-world environments with increased performance inefficiency, safety, and flexibility, and greatly reduced computational requirements. In addition, improvements in the robustness and graceful degradation characteristics are expected from this approach. The system looks after both longitudinal (forward and backward) and angular (left and right) movements of the chair. In addition, we implemented on-board capability to carry out "recognition" of the environment followed by limited vocal interactions with the user, power wheelchair for use by people with various types and degrees of handicap based on our experience, methods used and some issues related to the application of the behaviour-based approach to realize an intelligent wheelchair and possibly other assistive technologies are discussed. A brief survey is also presented of other groups who are working in this area [2].

II. OBJECTIVES

Automated wheelchairs that are equipped with sensors & data processing unit are termed as Smart Wheelchair. Our goal is to design and develop a system that allows the user to robustly interact with the wheelchair at different levels of the control and sensing.

III. SYSTEM CONFIGURATION

A regular battery powered wheelchair produced and marketed inwas used asthe base of the first implementationof theconcept. A set of sensors, a computerizedautonomy management unit, andnecessaryharnesses were built.

A. Planned functions of the chair

1) Basic collision avoidance

This is achieved by behaviours which monitor and respond to inputs from on-board CCD camerasor those which

respond to active infrared (IR) sensors. When the chair encounters an obstacle, it firstreduces its speed, and then depending on the situation it faces, stops or turns away from the obstacleto avoid hitting it. The obstacle can be inanimate (e.g., a column in a hallway, a light pole on thesidewalk, a desk, a standing human) or animate (a passerby, a suddenly opened door in its path, anapproaching wheelchair). Encountering a moving obstacle, the chair first tries to steer around it. If it cannot, it stops and backs off if the speed of the advancing obstacle is slow enough (e.g., 20centimeters per second). Otherwise, it stays put until the obstacle passes away. Thus, if the chairencounters another wheelchair, both chairs can pass each other smoothly as long as there is enoughspace in the passage for two chairs. A fast paced human usually does not affect the chair's progressand at most causes the chair to temporarily slow down or steer away [6].

2) Passage through a narrow corridor:

When surrounded by walls on each side of the path, as in a hallway, the chair travelsautonomously from one end to the other parallel to the walls [6].

3) Entry through a narrow doorway:

The chair automatically reduces its speed and cautiously passes through a narrow doorway whichmay leave only a few centimetres of space on each side of the chair. Some types of ailment such asParkinson's disease or polio often deprive a human of the ability to adjust the joystick of a powerwheelchair through such a tight passage [4].

4) Manoeuvre in a tight corner:

Similarly, when the chair is surrounded by obstacles (e.g., walls, doors, humans), it is oftendifficult to handle the situation manually. The autonomous chair should try to find a break in thesurroundings and escape the confinement by itself unless instructed otherwise by the user.

5) Landmark-based navigation:

Two CCD colour cameras on-board the chair are used for functions explained in (1), (2), and (3)above. They constantly detect the depth and size of free space ahead of the chair. The cameras arealso used to identify landmarks in the environment so that the chair can travel from its presentlocation to a given destination by tracing them.[6] An on-board topological map is used to describe thesystem of landmarks.

B. Hardware structure

As a standard powered wheelchair, model 760V has two differentially driven wheels and twofree front casters. Although they are designed to rotate freely around their vertical and horizontalaxis, these casters typically give fluctuations in delicate manoeuvres due to mechanical hysteresis thatexists in them because of design constraints (the rotating vertical shaft of the support structure ofthe caster cannot be at the horizontal centre of the caster). This sometimes causes the chair to wiggleparticularly when its orientation needs to be adjusted finely. Such fine adjustments are necessarytypically when a wheelchair tries to enter a narrow opening such as a doorway.The entire mechanical and electrical structure, the electronics, and the control circuitry of theoriginal power wheelchair were used without modification. The prototype autonomy managementsystem still allows the chair to operate as a standard manually controlled electric wheelchair usingthe joystick. The joystick can be used anytime to seamlessly override the control whenever the userwishes even in autonomy mode. additions to the chair were also kept to a minimum. AI components added to the chairwere made visually as transparent as possible [1]. Two processor boxes, one for vision-based behaviour generation and the other for non-vision behaviour generation are tacked neatly under the chair's seat,hidden completely by the wheelchair's original plastic cover. Sensors are hidden under the footrests,inside the battery case, and on other supporting structures. Only the two CCD cameras are a littlemore visible: they are attached to the front end of the two armrests for a good line of sight. A smallkeypad and miniature television set are installed temporarily over the left armrest to enterinstructions and for monitoring.The non-vision behaviour generator is based on a Motorola 68332 32-bit micro controller. Amulti-tasking, real-time operating system was developed and installed as the software framework.This combination gave the system the capability to receive real-time signals from a large numberof sensors and to send drive outputs to the two motors which govern the wheels. The chair currentlyhas several bump sensors and 12 active infrared (IR) sensors which detect obstacles in close vicinity(less than 1 meter) of the chair. Signals from the cameras are processed by a vision-based behaviour generation unit based on a DSP board[8].

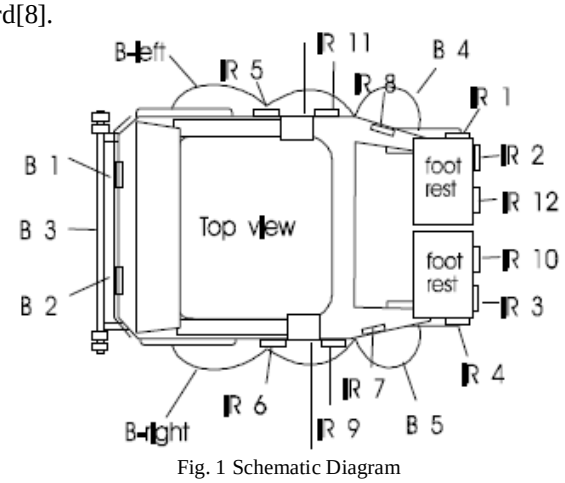

Fig. 1 Schematic Diagram

C. Software structure

Software for the vision system is also built according to behaviour basedprinciples. The major difference between this and conventional image processing is that itconsists of behaviours, each of which generates actual behaviour output to the motors. It can presentlydetect depth and size of free space, vanishing point, indoor landmarks, and simple motions

up to 10meters ahead in its path. Indoor landmarks are a segment of ordinary office scenery that naturallycomes in view of the cameras. No special markings are placed in the environment for navigation.There are also a large number of behaviours invoked by IRs and bumpers which collectivelygenerate finer interactions with the environment. Vision-based and non-vision behaviours jointlyallow the chair to proceed cautiously but efficiently through complex office spaces. Note that thereis no main program to coordinate behaviours.Currently, the autonomy program occupies about 35 Kbytes for all of the vision relatedprocessing and 32 Kbytes for other behaviour generation and miscellaneous computation. Of the 35Kbytes for vision related processing, only about 10 Kbytes are directly related to behaviour generation. The rest are involved in various forms of signal pre-processing: generation of depth map,calculation of the size of free space, estimation of the vanishing point, and detection of specificobstacles in the immediate front of the chair.Of the remaining 25 Kbytes, approximately 20 Kbytes are used in the neural network systemfor detecting landmarks and referencing a topological map [7]. The current implementation of thelandmark system consumes only 256 Bytes per landmark, although this figure may change in thefuture as more sophisticated landmark description might become necessary. The current system has
space for up to 64 landmarks but this can also be adjusted in future versions.Of the 32 Kbytes of non-vision processing (i.e., processing of inputs from IR's , bump sensors,voice I/O, etc.), again no more than several Kbytes are spent for generating behaviours. A considerable amount of code hasbeen written to deal with trivial periphery, such as keypad interface, voice I/O, and LCD display.The comparable inefficiency of coding is because these non-behavioural processing had to be described in more conventional algorithms.

IV. APPLICATIONS

- Hospitals
- Health care centres
- Old age home
- Physically handicapped individuals
- In industries as robot to carry goods.
- Automatic gaming toys.
- Communication
- Control of Mechanical systems
- Sports
- Feedback in Computer Based Learning environment

V. ADVANTAGES & DISADVANTAGES

A. *Advantages*

Power wheelchairs, also referred to as electric wheelchairs, are a common aid to daily living for people who are disabled or elderly. Power wheelchairs provide many advantages for wheelchair-bound people. Many people who require a wheelchair find a power wheelchair offers more benefits than a bulky manual wheelchair.

- Increased mobility, For disabled people who cannot use their arms to power a manual wheelchair, or for people who do not have the upper body strength to self-propel a manual wheelchair, power wheelchairs offer the ability to be mobile with the use of a joystick or mouthpiece, such as the sip and puff control described by Wheelchair.ca or a tongue-controlled wheelchair.
- Increased Manoeuvreability, Power wheelchairs use casters that swivel a full 180 degrees to provide more manoeuvreability, especially in small areas, according to the Electric Wheelchairs Centre. Manoeuvreability is one of the key problems associated with wheelchair use. Power wheelchairs allow a disabled individual to get around tight spaces and move through smaller areas, which is especially beneficial at home.
- Increased Physical Support, A power wheelchair can have the option to allow for more physical support, including adjustable seating such as tilt and recline. Power wheelchair users can also adjust the height of the chair to see their environment more clearly. Some power wheelchairs also have the option of elevation to help a person get to a standing position.
- Increase disabledpeople's ability to live independently – to enjoy the same choice, control and freedom as any other citizen –at home, at work, and as members of the community.
- Enable young disabled children and their families to enjoy „ordinary" lives, through access to childcare, early education and early family support to enable them to care for their child effectively and remain socially and economically included;
- Support disabled young people and their families through the transition to adulthood. Transition will be better planned around the needs of the individuals and service delivery will be smooth across the transition.
- Increase the number of disabled people in employment while providing support and security for those unable to work.
- Improving the life chances of disabled people.

B. *Disadvantages*

- The disadvantage faced by disabled people imposes significant economic and social costs.
- Although power wheelchairs do have some disadvantages, many of them can be turned into advantages with extra money or additional features. Typically a power wheelchair will not fold up or come apart. Most individuals who need to travel may not have a van or larger vehicle to store the power wheelchair; therefore they will have to make other

plans. You may have to purchase an additional manual wheelchair for trips. Another option would be to spend more money on a power wheelchair and purchase one that folds ups or will disassemble fairly easily. The fold up power wheelchairs is available in most stores; however, they can cost quite a bit more than traditional power wheelchair.

- Even since power wheelchairs have increased in popularity, there are still many disabled, injured, or elderly individuals who are unable to purchase a power wheelchair. The number one reason why an individual who would like to purchase a power wheelchair cannot is due to financial reasons. Before purchasing a power wheelchair or completely ruling one out, it is important to speak with insurance or Medicare representatives. Many individuals are not aware of the fact that if a wheelchair is advised by a doctor, it may be fully or partial covered.

VI. FUTURE SCOPE

- We can make a wheelchair which can be operated by a wireless remote. Output of sensor can be applied to wireless transmitter circuit and can received at wheelchair circuit by receiver circuitry. So wireless operation can reduce wiring arrangements.
- Instead of using acceleration motion (Head Movement) we can use eye retina using optical sensor to move wheelchair in different direction. Using retina movement we would be able to drive a wheelchair.
- We can use voice command IC to interface our voice signals with microcontroller. So computer interfacing may not be needed. The voice stored in IC could be sufficient to analyze speaker's voice Command.
- Researchers are going on development of handicap wheelchair using nervous system of human.

VII. CONCLUSIONS

The wheelchairs based on commercially available motorized wheelchairs have been built using behaviour-based AI. The size of the software is significantly smaller than control programs for similar vehicles operatingin the real world environment implemented using conventional AI and robotics methodologies. Oneof the chairs is now capable of travelling to its indoor destinations using landmark-based navigation.
The performance of our system configuration indicates there is a cautious possibility today to build a functionalintelligent wheelchair that is practical and helpful to people with certain types and degrees ofhandicap.

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MRI-HIFU

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ABSTRACT

MRI-guided 'high-intensity focused ultrasound' (MR-HIFU) is a new, image-guided, non-invasive technique which enables treatment of benign and malignant tumors by thermo ablation by ultrasound waves. The treatment is completely guided by MRI, which offers advantages for therapy planning, monitoring and visualization of the treatment result. MR-HIFU has a broad spectrum of applications, including ablation of uterine fibroids, breast cancer, and liver metastases. Most of these applications are still under research. The advantage of the non-invasive character of the treatment is that it can be performed on an outpatient basis and that recovery is fast. The University Medical Center Utrecht, the Netherlands, has a MR-HIFU system that, as well as for pre-clinical experimental applications, is used for clinical treatment of uterine fibroids.

Keywords*: *HIFU, thermo ablation, uterine fibroid, ultrasound.

Introduction

High-Intensity Focused Ultrasound (HIFU, or sometimes FUS for Focused Ultrasound) is a highly precisemedical procedure that applies high-intensity focused ultrasound energy to locally heat and destroy diseased or damaged tissue through ablation. HIFU is a hyperthermia therapy, a class of clinical therapies that use temperature to treat diseases. HIFU is also one modality of therapeutic ultrasound, involving minimally invasive or non-invasive methods to direct acoustic energy into the body. In addition to HIFU, other modalities include ultrasound-assisted drug delivery, ultrasound hemostasis, ultrasound lithotripsy, and ultrasound-assisted thrombolysis. Clinical HIFU procedures are typically performed in conjunction with an imaging procedure to enable treatment planning and targeting before applying a therapeutic or ablative levels of ultrasound energy. When Magnetic resonance imaging (MRI) is used for guidance, the technique is sometimes called Magnetic Resonance-guidedFocused Ultrasound, often shortened to MRgFUS or MRgHIFU. When diagnostic Sonography is used, the technique is sometimes called Ultrasound-guided Focused Ultrasound (USgFUS or USgHIFU). Currently, MRgHIFU is an approved therapeutic procedure to treat uterine fibroids in Asia, Australia, Canada, Europe, Israel and the United States. USgHIFU is approved for use in Bulgaria, China, Hong Kong, Italy, Japan, Korea, Malaysia, Mexico, Poland, Russia, Romania, Spain and the United Kingdom. Research for other indications is actively underway, including clinical trials evaluating the effectiveness of

HIFU for the treatment of cancers of the brain, breast, liver, bone, and prostate. At this time non-image guided HIFU devices are cleared to be on the market in the US, Canada, EU, Australia, and several countries in Asia for the purposes of body sculptingSelect the test sequence corresponding to your standard of choice

What is HIFU?

MR-HIFU or Magnetic Resonance Imaging guided High-Intensity-Focused-Ultrasound is a non-invasive alternative which uses high-intensity ultrasound waves that are focused into small areas to produce heat for killing tumor cells.

The focused sound waves coagulate the myoma tissue at the point of focus without affecting the surrounding tissue. To ensure efficient ablation, the focused ultrasonic beam moves quickly over the lesion to be ablated (Volumetric ablation). The myoma tissue, at the point of focus, heats up to approx. 60-65 degree C and is consequently necrosed. The procedure is monitored with real-time MR images which provide real-time feedback through thermal mapping.

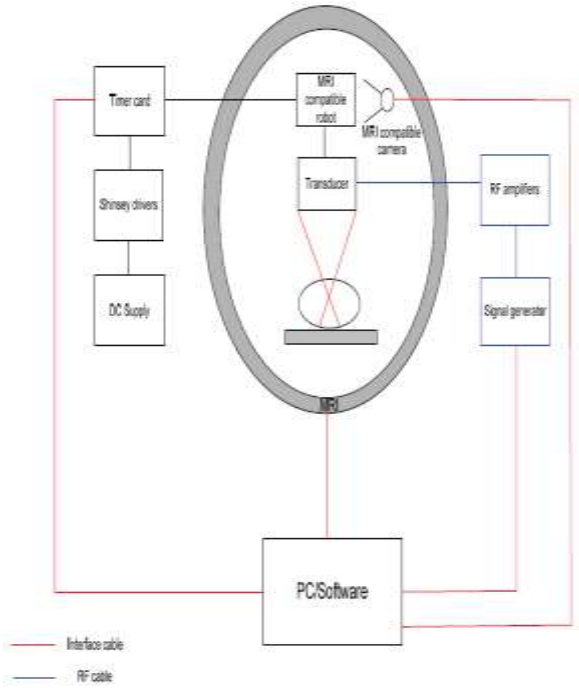
The HIFU concept:

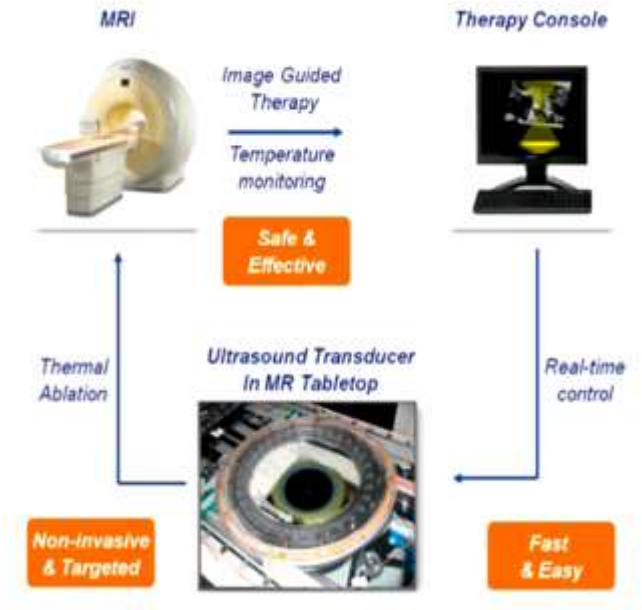
In high intensity focused ultrasound (HIFU), a specially designed transducer is used to focus a beam of ultrasound energy into a small volume at specific target locations within the body. The focused beam causes localized high temperatures (55 to 90°C) in a region as small as 1 x 1 x 5 mm. The high temperature, maintained for a few seconds, produces a well-defined region of necrosis. This procedure is referred to as ultrasound ablation. The tight focusing properties of the transducer limit the ablation to the target location. In many applications, the ultrasound therapy is guided using diagnostic ultrasound.

However, ultrasound imaging does not provide the high resolution images, real-time temperature monitoring, and adequate post treatment lesion assessment required for fast and effective therapy. In contrast to ultrasound, MR imaging offers excellent soft tissue contrast, 3D imaging capabilities, and noninvasive temperature measurement techniques.

CONSTRUCTION & WORKING

Block Diagram:





How HIFU works:

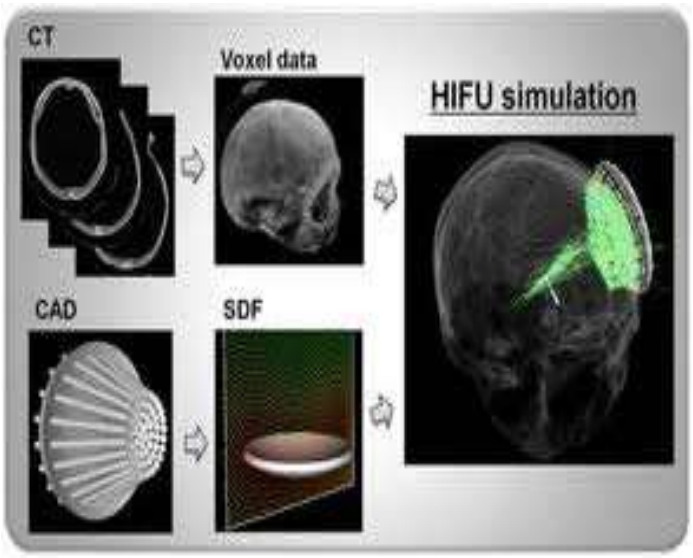
As an acoustic wave propagates through the tissue, part of it is absorbed and converted to heat. With focused beams, a very small focus can be achieved deep in tissues (usually on the order of millimeters, with the beam having a characteristic "cigar" shape in the focal zone, where the beam is longer than it is wide along the transducer axis). Tissue damage occurs as a function of both the temperature to which the tissue is heated and how long the tissue is exposed to this heat level in a metric referred to as "thermal dose". By focusing at more than one place or by scanning the focus, a volume can be thermally ablated. At high enough acoustic intensities, cavitation (micro bubbles forming and interacting with the ultrasound field) can occur. Micro bubbles produced in the field oscillate and grow (due to factors including rectified diffusion), and can eventually implode (inertial or transient cavitation). During inertial cavitation, very high temperatures inside the bubbles occur, and the collapse is associated with a shock wave and jets that can mechanically damage tissue. Because the onset of cavitation and the resulting tissuedamage can be unpredictable, it has generally been avoided in clinical applications. However, cavitation is currently being investigated as a means to enhance HIFU ablation and for other applications.

Focusing:

The ultrasound beam can be focused in these ways:

• Geometrically, for example with a lens or with a spherically curved transducer.

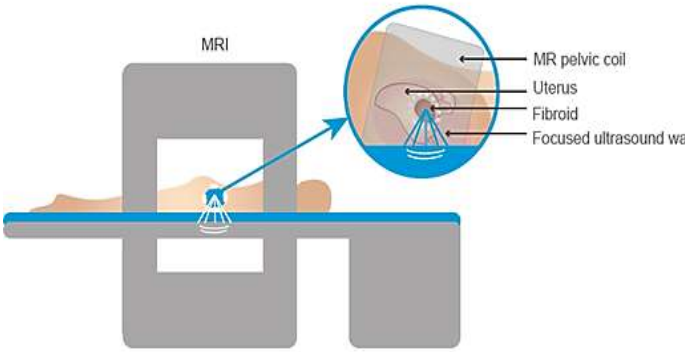
• Electronically, by adjusting the relative phases of elements in an array of transducers (a "phased array"). By dynamically adjusting the electronic signals to the elements of a phased array, the beam can be steered to different locations, and aberrations in the ultrasound beam due to tissue structures can be corrected



How MRI does guided HIFU works?

The MRI acquires high resolution 3-D images of the fibroid and

surrounding structures. These images are used for accurate planning and mapping of the treatment. During treatment, the HIFU transducer focuses the ultrasound beam into the fibroid as per the planned areas (cells) and heats the tissue up to 65 degree Celsius, coagulating it. This is called sonication. . Sonalleve MRI guided HIFU ensures patient safety by having a number of safety mechanisms built into the system. All of these ensure that apart from the tissue being targeted, no other organ or tissue is affected by the treatment. During treatment, the MRI plays an important role by monitoring temperatures within the treatment areas as well as in the surrounding tissues. The recorded temperatures are then superimposed in the form of colour coded maps on the 3-D images that are being used for the treatment monitoring. The real-time feedback loop ensures that adequate heating takes place, treating every bit of tissue that has been targeted and volumetric ablation (a Philips proprietary technology) helps treat larger volumes efficiently and quickly. Thermal mapping contributes to safety by ensuring that the treatment remains within the recommended temperature levels, and that the surrounding tissues are not affected at all. In addition, Motion detection with automatic adjustment/suspension of sonication also ensures that the procedure is safe. An emergency stop button that is controlled by the patient allows the patient to pause the treatment whenever she needs to, and the treatment can be resumed once she is comfortable.



- **Advantages of HIFU**
    - No blood loss
    - Quick recovery
    - Non-surgical
    - Radiation free
    - An outpatient procedure
    - It reduces morbidity and mortality among women of child bearing age

Conclusion:

From above all detail description I have to conclude that MRI-guided HIFU ablation may be a safe and effective minimally invasive technique for the treatment of uterine fibroids. HIFU treatment on uterine fibroid was proved to be effective in this study through analyzing 70 cases clinical data of examinations and results. However, how to evaluate the therapy efficacy is always cared. Because HIFU is a new technique from ultrasound, the tumor response to therapy mostly are accurately evaluated by using contrast-enhanced ultrasound and MRI imaging combined with routine ultrasound, color Doppler flow imaging and power Doppler ultrasound**.**

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Bio-inspired "Superglue" can mend'Broken Hearts'

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Abstract-
We have been using Staples and sutures have been using for decades and there has been really minimal innovation. They have inherent limitations. These are difficult to place in small spaces like during laparoscopic or minimally invasive procedures. One example of glue that has approved is a medical "grade crazy glue" or "super glue". It's only been approved for minimal uses. When we use it inside the body, we actually have to dry the tissue before we apply it because it's just so highly reactive. The glue HLAA (Hydrophobic Light Activated Adhesive) can be used in operations to seal holes in the heart. It is polyglycerol sebacate acrylate (PGSA). This paper presents the discovery of medical superglue and its approach to heal or patch up holes in the blood vessels and heart walls with easier technology. This adhesive sets in few seconds when exposed to UV light. This important contribution of this work include: Discovery of a new light activated glue which can replace the use of sutures and staples and to form a watertight seal to wet tissue.

Keywords- Polyglycerol Sebacate Acrylate, HLAA, Sutures, Staples.

I. INTRODUCTION:

It is a minimally invasive technique in which light activated glue is used as an adhesive to patch up the holes in blood vessels and the heart's walls since both the glue and the light can be delivered by thin tools. Adhesive testing is done in most demanding and dynamic environment in the body- the heart and is found to be successful. Existing medical glues are not strong enough to use in challenging situations, for example where there is high blood flow or if tissue is moving such as in the heart. The medical glues that are currently used are water soluble, so they can be easily washed away, and also they can be activated by contact with blood. Contraction of heart and constant blood flow make reconnecting blood vessels, attaching devices and sealing holes in the heart during surgery difficult. Sutures and staples are routinely used, but are not elastic and can exert damaging pressure on tissue. Yet most currently available medical grade superglues are toxic-triggering an inflammatory response and buckle under the high pressure force of blood flowing in larger vessels. This new material is able to resist physiologic blood pressures while maintaining some elasticity, allowing for proper function of the vessels.
The ways of sealing congenital heart defects in infants that are needed, were creating a laundry list of properties of the ideal surgical glue. The material had to be elastic, biodegradable, biocompatible and had to stick strongly to the tissue under wet conditions, especially in presence of blood and found that the pre- polymer (poly glycerol sebacate acrylate), or PGSA, fit all of criteria except that it was only partially adhesive. A modified PGSA was well attached to the tissue and imparted the material with on-demand adhesiveness. The resulting glue contains a chemical that when activated by Ultra-violet light creates free radicals that lock the polymer in place but allows the material to remain elastic.

II. METHODOLOGY:

In California, slugs and sandcastle worms are found. These creatures can produce viscous secretions that are not easily washed away and do not mix with water. Studying these secretions which are viscous and water repellant, a material is made that performs well under this condition, is elastic and biocompatible, and fully biodegrade over time. A compound of two naturally occurring substances – glycerol and sebacic acid is developed which is named as hydrophobic light activated adhesive (HLAA). The mixture is viscous and easy to spread over the surface. When activated to UV light, it becomes a strong and flexible adhesive.

Fig.1. Slugs and sandcastle worms

a) A series of experiments that have been performed:

- Comparison of patches covered in HLAA with current medical glue by sticking them to the outside of rats' hearts
- Comparative studies of HLAA to conventional stitches by making a hole in the heart of two groups of rats, and used the HLAA patches to close it in one group (n=19) and compared this to using stitches in the other (n=15)
- Putting patches coated with HLAA on the septum of four pigs' hearts
- Gluing of a small cut measuring 3-4mm to a pig artery in the laboratory using HLAA and then assessed at what pressures it would remain closed to see if it could cope with human blood pressures

b) Constituents of the glue and their chemistry

Sebacic acid is a naturally occurring dicarboxylic acid with the structure (HOOC) $(CH_2)_8$(COOH). In its pure state it is a white flake or powdered crystal. The product is described as non-hazardous, though in its powdered form it can be prone to flash ignition (a typical risk in handling fine organic powders).Sebacic acid is a derivative of castor oil, with the vast majority of world production occurring in China which annually exports over 20,000 metric tonnes, representing over 90% of global trade of the product.

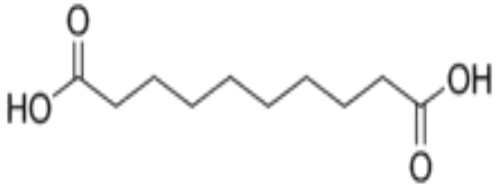

Fig no.2.Structural formula for Sebacic acid

Glycerol also called as glycerine is a simple polyol (sugar alcohol) compound. It is a colourless, odourless, viscous liquid that is widely used in pharmaceutical. The glycerol backbone is central to all lipids known as triglycerides.

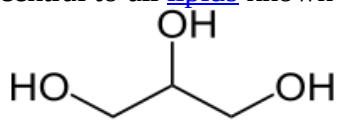

Fig no.3. Structural formula for glycerol

HLAA is used in operations on small and large animals that would be similar to human operations, including the repair of cuts to blood vessels and closing holes in the wall of the heart.

The research found that HLAA is 50% as strong as the medical glue currently in use. However, when the glue is put onto patches, it is possible to put it into position without the glue being washed off. It is then fixed with UV light. When the same technique is performed using the current type of glue, it is immediately activated when it comes into contact with the blood and is therefore harder to use.

Patches covered with HLAA sticks to the outer layer of the hearts of rats and could be repositioned before sticking with the UV light, whereas the patches using current medical glue can't. Staples and sutures have been using for decades and there has been really minimal innovation. They have inherent limitations. These are difficult to place in small spaces like during laparoscopic or minimally invasive procedures. One example of glue that has approved is a medical "grade crazy glue" or "super glue". It's only been approved for minimaluses. When we use it inside the body, we actually have to dry the tissue before we apply it because it's just so highly reactive

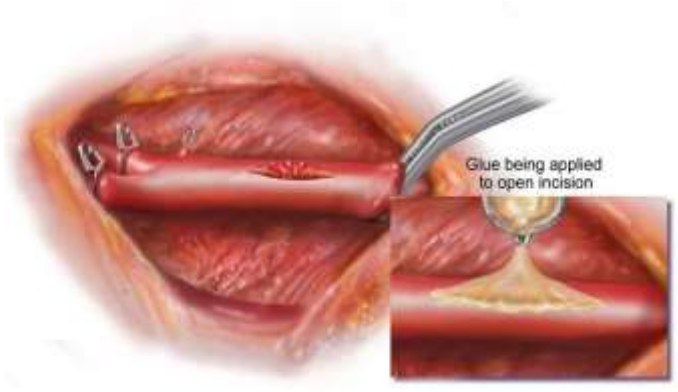

Fig.no.4. Image of glue being applied to open incision

c) Implantation:

The glue is viscous and it is in a liquid state, so we can inject it. We can even paint it on. We can place this onto the surface of a patch-like material and then we can deploy this. So, in some instances, we may use the glue alone by injecting through a minimally invasive device for example wherever we inject the glue, as soon as it hits a surface, because it's so viscous, it just stays there. Then also, what is found which is quite fascinating is that the glue is able to penetrate into the tissue. So, it actually goes into the tissue fibres and then when we shine UV light, this actually cures and locks the glue into place. . In other instances, we can coat it on the surface of a patch and even a biodegradable patch so the entire system, the glue, and the patch will degrade.

We can shine a fairly low level of intensity of light over a short period of time. So typically, it only takes maybe 5 to 30 seconds to get a complete cure. So we, in our initial experiments, we actually looked at this in extensive detail and found intensities of light that did damage the tissue. But then we were able to scale that back and it still achieved a strong fast cure without doing damage to the tissue. As it is biocompatible, so if being gelatinous it breaks off from where you deploy it, the cells and tissue can grow over them quickly. And so, right after we place this glue into heart or onto the surface of a blood vessel for example, within just a few days, it's already starting to be coated with cells and other tissue. So, that will significantly limit the potential for chunks to break off, and cause an embolism or a stroke.

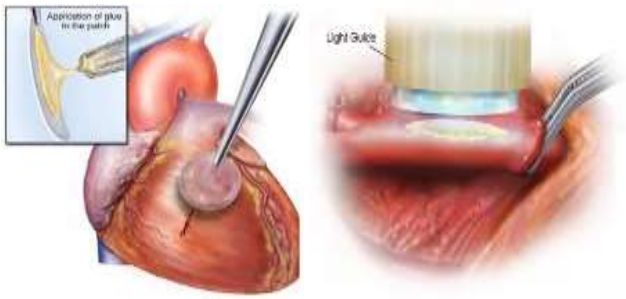

Fig no.5. Implantation of glue on heart walls

Properties of the adhesive:

- It sticks well to wet tissues
- It repels blood and water
- It is non inflammatory
- It is thick and sticky until it is activated by UV light
- It allows proper functioning of vessel resisting physiologic blood pressure
- It is a non toxic polymer that doesn't mix with water
- It sets quickly when exposed to UV radiations
- It is a viscous liquid
- The glue is elastic, biocompatibleand sticks strongly to tissue under wet conditions especially in presence of blood.

III. CONCLUSION:

Actually, when we use this glue inside the body we need not to care whether the tissue is dried or not because the glue is water and blood repellent and thus it can successfully heal the surface of a patch. Along with this adhesive material is made from naturally occurring substances and shows high biocompatibility. Therefore when we would implant it, it wouldn't promote immunity action against the glue and thus would promote the body in support of healing. The performance analysis shows that the hydrophobic light activated glue (HLAA) can reach an agreement that it can successfully meet the needs of surgeons and doctors in operating with the tissues having constant blood flow and also during minimally invasive procedures.

IV. FUTURE WORK:

What has been shown so far is a proof of principal and a potential for use in the clinic .This is a major improvement over current suturing adhesives that often loose their stickiness in bloody situations. And it has the added benefit of working quickly because its adhesiveness is activated by ultraviolet light, which enables surgeons to quickly activate the material when they need to seal a hole. Many infants born with heart defects have to undergo repeated surgeries as they grow. Replacing the sutures and staples used in surgery today with fast-acting, biodegradable glues could help make these cardiac procedures faster and safer.

V. ACKNOWLEDGEMENT:

This work has been completed with the help of our principal sir, HOD sir of BME department, Prof. A.Fursule sir and Prof.Sandeep Ghughe sir.

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DSP Based Standalone ECG Monitoring System : A Case Study

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Abstract— **This paper describes the implementation of low cost standalone Digital Signal Processing (DSP) hardware for ECG monitoring in order to assist physician or cardiologist to carry out their visual observation in ECG monitoring. The visual observation is in real time, where the acquired ECG from the subject can be seen on the graphic LCD and it is important to ensure the signal is stable and consistent before the pre-recording session take place which would help the cardiologist's or physician's in analysis and diagnosis, accurately. The design of the DSP hardware based stand alone system are divided into three hardware units, first the digital signal processor with memory unit, second is the signal monitoring displays unit and third is analog front end unit. Firmware development in this system design is to attach each hardware unit to perform specific functions in carrying out operation on the stand alone system. The advantages of this system are the ability to run in stand-alone operation and as well as eligibility of updating on board pre-program algorithm for ECG analysis which existing ECG monitoring equipment are lacking, which means that this stand alone system could be programmed to suit a particular need.**

Keywords— **Electrocardiogram (ECG), Digital Signal Processing (DSP),Analog to Digital Converter(ADC)**

I.INTRODUCTION

Non-invasive Electrocardiogram approach has become the standard practice in clinical environment, after it is first made known by Eithoven. Then, the discovery of ECG brings forward the opportunities for further research and development. So, in year 1947, modern ECG recording machine is introduced by Norman Jeff holter. Later it is called Holter Ambulatory Electrocardiography. Hence along the path it gave birth to the ECG recording system which is populated by the invention of microprocessor in the later years. Indeed, ECG recording trend is turning a new leaf when microprocessor is embedded with electronic gadget in various hardware platforms, which allows full assessment to the collected data of electrocardiography. However, in the early microprocessor system, the ECG signal is compressed while the system is in recording mode, then it is stored and the analysis is done on computer. After that, ECG recording also have had evolved throughout the decades with the growth of technology in signal processing. Later on, the impact of the signal processing achievements created a paradigm shift and alters the being of hardware computation when mathematically algorithms are applied in signal analysis.

Since then, the algorithmic activities show favors in non-computer dependant operation with efficiency in numerical processing. Then, it is followed by the influential of its outcome which is ushering the microprocessor step into higher stage by means of doing solo numerical computing. Follow by the pro-active influent, leads the conventional microprocessor to cushion the successor which is succeeded with a greater benefit of achievements when the digital signal processor (DSPs) is introduced and in promotion in year 1971. Thus, the DSPs offers built in and integrated with mathematical capabilities and proficiency of numeric functional as compared with others available non-DSP terms in the general microprocessor. Nevertheless, it is also capable of doing on chip" analysis, which is, including real time signal processing. Therefore, the advantages of DSPs had open door to enable ECG analysis to be done in real time processing instead of recording and stored for later analysis.

The introduction of DSP processor had brought forward realization for integrating DSP board to computer based for real time ECG analysis. One of the common hardware tools involved ECG in computing is the plug n play DAQ card. In this system, add on hardware such as data acquisition card is required for this purpose. Where the dependency for plug in data acquisition card in the computer itself required software development, such as firmware and application software is necessary to establish communication link with the connected card. Those integrated data acquisition card with software application can provide a magnificent outcome, but lack of mobility, expensive and computer dependant. But a custom build Printed Circuit Board (PCB) with specialty electronics design are more prefer to use in standalone operation for specific task.

1.1 Electrocardiogram

Electrocardiography (ECG or EKG from Greek*kardia*, meaning heart) is a transthoracic (across the thorax or

chest) interpretation of the electrical activity of the heart over a period of time, as detected by electrodes attached to the surface of the skin and recorded by a device external to the body. The recording produced by this noninvasive procedure is termed an electrocardiogram (also ECG or EKG). An ECG is used to measure the rate and regularity of heartbeats, as well as the size and position of the chambers, the presence of any damage to the heart, and the effects of drugs or devices used to regulate the heart, such as a pacemaker. Most ECGs are performed for diagnostic or research purposes on human heart, but may also be performed on animals, usually for diagnosis of heart abnormalities or research.

An ECG is a way to measure and diagnose abnormal rhythms of the heart, and helps to diagnose properly particularly abnormal rhythms caused by damage to the conductive tissue that carries electrical signals, or abnormal rhythms caused by electrolyte imbalances. In a myocardial infarction (MI), the ECG can identify if the heart muscle has been damaged in specific areas, though not all areas of the heart are covered.The ECG cannot reliably measure the pumping ability of the heart, for which ultrasound-based (echocardiography) or nuclear tests are used. It is possible for a human or other animal to be in cardiac arrest, but still have a normal ECG signal (a condition known as pulse less).

The ECG device detects and amplifies the tiny electrical changes on the skin that are caused when the heart muscle depolarizes during each heartbeat. At rest, each heart muscle cell has a negative charge, called the membrane potential, across its cell membrane. Decreasing this negative charge towards zero, via the influx of the positive cations, Na^{+} and Ca^{++}, is called depolarization, which activates the mechanisms in the cell that cause it to contract. During each heartbeat, a healthy heart will have an orderly progression of a wave of depolarization that is triggered by the cells in the senatorial, spreads out through the atrium, passes through the atrioventricular node and then spreads all over the ventricles. This is detected as tiny rises and falls in the voltage between two electrodes placed either side of the heart which is displayed as a wavy line either on a screen or on paper. This display indicates the overall rhythm of the heart and weaknesses in different parts of the heart muscle.

Figure Shows Schematic representation of normal ECG. The P waves, QRS complex and T waves shows the activation of the right and left atria, depolarization of the right and left ventricles and ventricular activation.

Fig: Schematic representation of normal ECG

1.2 Digital Signal Processing

Digital Signal Processing deals with algorithms for handling large chunk of data. This branch identified itself as a separate subject in 70s when engineers thought about processing the signals arising from nature in the discrete form. Development of Sampling Theory followed and the design of Analog-to-Digital converters gave an impetus in this direction. The contemporary applications of digital signal processing was mainly in speech followed by Communication, Seismology, Biomedical etc. Later on the field of Image processing emerged as another important area in signal processing.

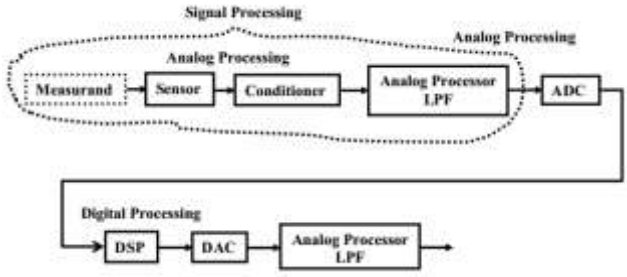

Fig. The basic Signal Processing Platform

The figure shows represents a Real Time digital signal processing system. The measure and can be temperature, pressure or speech signal which is picked up by a sensor (may be a thermocouple, microphone, a load cell etc). The conditioner is required to filter, demodulate and amplify the signal. The analog processor is generally a low-pass filter used for anti-aliasing effect. The ADC block converts the analog signals into digital form. The DSP block represents the signal processor. The DAC is for Digital to Analog Converter which converts the digital signals into analog form. The analog low-pass filter eliminates noise introduced by the interpolation in the DAC.

II. LITRATURE REVIEW

At first, Holter relied entirely on personal funds but later (beginning in 1952) received grants from the National Institutes of Health and, still later, from private funds. Although he and Generalised that small-sized equipment would be essential for successful practical telemetering of physiologic data, the first goal was to see if transmission of electroencephalograms or electrocardiograms (ECGs) was possible irrespective of the size of the equipment. Their first success was in broadcasting electroencephalograms and recording them accurately in a boy who was riding a bicycle nearby. Shortly thereafter, Holter switched from the brain to the heart because the heart's voltage is about 10 times greater than that of the brain, therefore making the electronics easier, and because heart disease is far more prevalent than cerebral disease.[2]

Taddei et al (1995) designed a rule-based system for two lead ECG recordings which employs a geometric algorithm that calculates a 2D loop for the ST segment. For each cardiac beat the ST segment deviations are estimated in the two leads and then each pair of values is graphically represented sequentially in time. A graphical rule is used to identify ischemic episodes. The system was tested using the ESC ST-T database and the Achieved sensitivity and positive predictive accuracy is 82% and 81%, respectively.

Costas Papaloukas et al (2002) developed Novel Rule-based Expert System was examined in detecting electrocardiogram (ECG) changes in long duration ECG recordings. The system distinguishes these changes between ST-segment deviation and T-wave alterations and can support the produced diagnosis by providing explanations for the decisions made. The European Society of Cardiology ST-T Database was used for evaluating the performance of the system. Sensitivity and positive predictive accuracy were the performance measures used and the proposed system scored 92.02% and 93.77%, respectively, in detecting ST segment episodes and 91.09% and 80.09% in detecting T-wave episodes.

Costas Papaloukas et al (2006) presented a novel methodology for the automated detection of ischemic beats that employed classification using association rules. The main advantage of the proposed methodology is the combination of high accuracy with the ability to provide interpretation for the decisions made, due to the employment of association rules for the Classification. The performance of their approaches compares well with previously reported results using the same subset from the ESC ST-T 24 database and indicates that it could be part of a system for the detection of ischemic episodes in long duration ECGs.

Erik Zellmer et al (2009) presented a highly accurate ECG beat classification system. It uses continuous wavelet transformation combined with time domain morphology analysis to form three separate feature vectors from each beat. Each of these feature vectors are then used separately to trainthree different SVM classifiers.

Philip Langley et al (2010) proposed an algorithm for analysing changes in ECG morphology based on PCA is presented and applied to the derivation of surrogate respiratory signals from single lead ECGs. The respiratory induced variability of ECG features, P waves, QRS complexes, and T waves are described by the PCA. The assessment of ECG features and principal components yielded the best surrogate for the respiratory signal**.**

III. STANDALONE ECG MONITORING SYSTEM

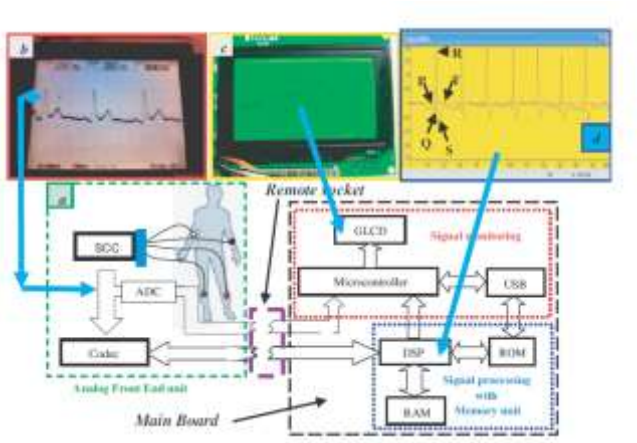

Figure1: Block diagram of prototype DSP stand alone system with the tapped ECG is checked with oscilloscope and display on the graphic LCD. The tap ECG also captured by the DSP processor and displayed on the window at Code Composer 3x/4x.

From Figure1 shows the operation for Analog Front End (AFE) unit interface with volunteer subject as shown in Figure 1(a), Figure 1(b) and Figure 1(c) respectively.

Figure 1(a) shows the tapped ECG from test subject, it is tapped from the Lead II formation on human body skin surface with four disposable electrodes placed on the right arm (white color), left arm (black color), right leg (green color) and left leg (red color), all the color code were referred to electrodes placement on human body.

Figure 1(b) shows the oscilloscope screen display from the output of AFE, this means that it is functional. Then, in Figure 1(c) shows that the output from AFE is able to read by microcontroller, PIC18F452 and display the tap ECG to the Graphic LCD. Emulator XDS510PP (PLUS) from Spectrum Digital Incorporated was attached to on board JTAG connector at TMS320VC33 by communicate through Code Composer 3x/4x in order to visualized the tap ECG at the graphical windows as depicted in Figure 1(d).

The capacity of the graphical windows can only display 2000 data. As a result, 7 cycles of tap ECG data were captured in approximately 7 second, all the captured

signal were labeled with its P, Q, R, S and T waves. These collected tapped ECG data are temporary stored in the external RAM as shown in Figure 1(d).

IV.HARDWARE PLATFORM.

In this DSP hardware design, is utilizing two processors by means of putting a single DSP processor (lack of tasks' oriented but capable of mathematical and algorithm executions) and a single microcontroller (performs best in tasking, but lack of DSP terms) into one system board. Therefore, this will provide separate traffic management for tasking and signal processing without over-loading each processor's work load.

This approach is depicted in Figure 1, the microcontroller is maintaining to display the tap ECG from ADC chip to the graphic LCD and the DSP processor is focused on reading the tapped ECG signal from the codec chip. However, the Universal Serial Bus (USB) in this DSP hardware design is for downloading the ECG analysis algorithm to the ROM and it is also use for power up the DSP hardware.

DSP hardware based stand alone system design is divided into three functional units. The solid lines with arrows symbol represent the flow of data and information. The dashed lines with green, red and blue color represent the functional hardware units. The DSP hardware consists of three functional hardware units, they are;

a).Signal processing with memory unit
b). Signal monitoring displays unit
c). Analog front End unit

a). Signal processing with memory unit: This unit provides signal altering, changing, re-solving, modification, storage and communication protocol. The mains components are floating point DSP processor (TMS320VC33), Electrical Erasable Programmable Read only Memory EEPROM (CAT28LV64W) and Static Random Access Memory SRAM (CY7C1041DV33). The SRAM memory is expandable in both the data bus and address bus width.

b). Signal monitoring displays unit: This unit provides display on graphical liquid crystal displays (GLCD) for monitoring ECG as shown in Figure 1. In this unit, the microcontroller, PIC18LF452 is configured to interact with graphical liquid crystal displays (GLCD). The microcontroller is added in this unit without interrupting the TMS320VC33, because the microcontroller performs best in tasking order, which capable of task orientation and lack of DSP terms. However, the ADC0820 received the input from the tap ECG signal through signal conditioning circuit (SCC) and the converted ADC data is latch to the output port of ADC0820. Then the tap ECG signal from SCC output was capture and converted by 8 bit Analog to Digital Converter chip set (ADC0820) and translated by PIC18LF452 into GLCD code in order to display on the GLCD.

Figure 2, shows that, upon initialization, the microcontroller put to observe the FT245RL chip set to get acknowledge and the observation is done through Port A of PIC18LF452. As the acknowledge signal is detected, and then the firmware will proceed to next step's label as 'A'. If there is no feed back for acknowledge signal by the FT245RL, then in this case, the next stage will begin with monitoring the external interrupt and the firmware loops. If the interrupt is detected, PIC18LF452 will initialize the Graphic LCD panel and begin to read the ADC data from Port C of PIC18LF452. After that, the tap ECG is put on GLCD screen to display as the ECG monitoring signal.

c) Analog front End unit; this unit provides interaction through peripherals connectivity with the real world environment. The peripherals such as in Figure 1 shows that the ECG is delivered to the main board through the custom build AFE device. This AFE input consists of; i) Signal conditioning circuitry (SCC), ii) Codec chip, PCM3003 and iii) Analog to digital converter chip set, ADC0820. In this DSP hardware design, is utilizing two processors by means of putting a single DSP processor (lack of tasks' oriented but capable of mathematical and algorithm executions) and a single microcontroller (performs best in tasking, but lack of DSP terms) into one system board. Therefore, this will provide separate traffic management for tasking and signal processing without over-loading each processor's work load.

(a) Test Subject: Resting in static condition

Figure 2: Real time ECG observation from test subject is captured and displayed on the graphic LCD.

This approach is depicted in Figure 1, the microcontroller is maintaining to display the tap ECG from ADC chip to the graphic LCD and the DSP processor is focused on reading the tapped ECG signal from the codec chip. However, the Universal Serial Bus (USB) in this DSP hardware design is for downloading the ECG analysis algorithm to the ROM and it is also use for power up the DSP hardware.

.1 DSP Processor (TMS320VC33)

The TMS320VC33 DSP is a 32-bit, floating-point processor manufactured in 0.18-µm four-level-metal

CMOS (Timeline) technology. The TMS320VC33 is part of the TMS320C3x generation of DSPs from Texas Instruments. The TMS320C3x's internal busing and special digital-signal-processing instruction set have the speed and flexibility to execute up to 150 million floating-point operations per second (MFLOPS). The TMS320VC33optimizes speed by implementing functions in hardware that other processors implement through software or microcode. This hardware-intensive approach provides performance previously unavailable on a single chip.

The TMS320VC33 can perform parallel multiply and ALU operations on integer or floating-point data in a single cycle. Each processor also possesses a general-purpose register file, a program cache, dedicated ARAUs, internal dual-access memories, one DMA channel supporting concurrent I/O, and a short machine-cycle time. High performance and ease of use are the results of these features. General-purpose applications are greatly enhanced by the large address space, multiprocessor interface, internally and externally generated wait states, one external interface port, two timers, one serial port, and multiple-interrupt structure.

The TMS320C3x supports a wide variety of system applications from host processor to dedicated coprocessor. High-level-language support is easily implemented through a register-based architecture, large address space, powerful addressing modes, flexible instruction set, and well-supported floating-point arithmetic.

The TMS320VC33 is a superset of the TMS320C31. Designers now have an additional 1M bits of on-chip SRAM, a maximum throughput of 150 MFLOPS, and several I/O enhancements that allow easy upgrades to current systems or creation of new baselines. This data sheet provides information required to fully utilize the new features of the TMS320VC33 device.

The simplified architecture of TMS320C6713 is shown in the Figure below. The processor consists of three main parts CPU, peripherals and memory.

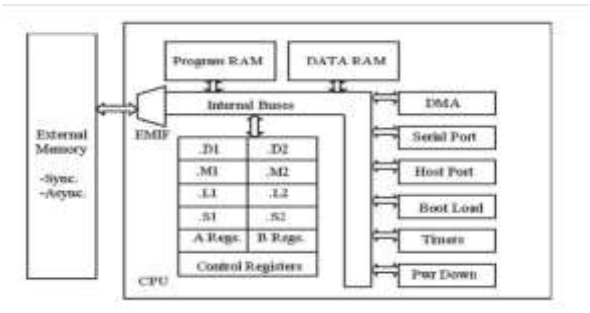

Figure: Simplified block diagram of TMS320C67xx family

4.2. Microcontroller, PIC18F452

The Microcontroller, PIC18F452 is 32 K. These devices come in 28-pin and 40/44-pin packages. The 28-pin devices do not have a Parallel Slave Port (PSP) implemented and the number of Analog-to-Digital (A/D) converter input channels is reduced to 5.

A microcontroller, a digital device, can read, execute and transmit only digital signals. On the contrary, the outputs of the most of the transducers are analog in nature. Thus it is hard to interface these transducers directly with controllers. Analog-to-digital convertor (ADC) ICs are one way to make the analog input compatible with the microcontroller.Using an external ADC adds complexity to the circuit. To avoid this complexity, PIC Microcontrollers have in-built ADC module which reduces the cost and connections of the circuit.

4.3 Signal Conditioning Circuit

Signal conditioning is a process of manipulating an analog signal in such way that it is optimized for further processing. Most common example will be Analog-to-Digital Converters (Abbreviate to ADC in future use). Signal conditioning is typically categorized into three stages; Filtering, Amplifying, Isolation. In Filtering stage, goal is to eliminate the undesired noise from the signal of interest. Usually low-pass, high-pass, or band-filter is implemented to eliminate unwanted signal.

In Amplifying stage, the goal is to increase the resolution of the input signal and increase the Signal-to-Noise Ratio (SNR). For example, the output of typical temperature sensor is in range of few millivolts and it is most likely too low for ADC to process directly. In addition, the noise within circuit is typically in range of few millivolts too, making ADC unable to distinguish between noise and signal of interest.

Lastly Isolation is a process of converting filtered & amplified signal to other form such as frequency so to pass the signal to measurement device without a physical connection. In uMAVRK module, an Isolation process is handled by built-in RF transmitter.

4.4 ADC 0820-N

The ADC0820-N uses two 4-bit flash A/D converters to make an 8-bit measurement . Each flash ADC is made up of 15 comparators which compare the unknown input to a reference ladder to get a 4-bit result. To take a full 8-bit reading, one flash conversion is done to provide the 4 most significant data bits (via the MS flash ADC). Driven by the 4 MSBs, an internal DAC recreates an analog approximation of the input voltage. This analog signal is then subtracted from the input, and the difference voltage is converted by a second 4-bit flash ADC (the LS ADC), providing the 4 least significant bits of the output data word.

The internal DAC is actually a subsection of the MS flash converter. This is accomplished by using the same resistor ladder for the A/D as well as for generating the DAC signal. The DAC output is actually the tap on the resistor ladder which most closely approximates the analog

input. In addition, the "sampled-data" comparators used in the ADC0820-N provide the ability to compare the magnitudes of several analog signals simultaneously, without using input summing amplifiers. This is especially useful in the LS flash ADC, where the signal to be converted is an analog difference.

V. CONCLUSION

We have presented the DSP based stand alone system design by using digital signal processor as the core processing unit. The DSP hardware is able to visualize the tap ECG on the graphical LCD (GLCD) as well as the digital signal processor is able to capture the tap ECG as shown on the graphical window in Code Composer 3x/4x. Nevertheless, this system design has laid the ground work for standalone operation in ECG monitoring purposes by using digital signal processor for real time signal processing.

The hardware system is ready to run any processing algorithm related to ECG. The algorithm can be continuously changed and tested to improve system performance and efficiency.

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Vision Based Hand Gesture Recognition for Robotic Control

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FPGA Implementation of Modified Booth Multiplier

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***Abstract*— To design a high speed multiplier with reduced error compensation technique. The fixed-width multiplier is attractive to many multimedia and digital signal processing systems which are desirable to maintain a fixed format and allow a little accuracy loss to output data. This paper presents the Design of error compensated truncation circuit and its implementation in fixed width multiplier. To reduce the truncation error, we first slightly modify the partial product matrix of Booth multiplication and then derive an effective error compensation function that makes the error distribution be more symmetric to and centralized in the error equal to zero, leading the fixed-width modified Booth multiplier to very small mean and mean-square errors. However, a huge truncation error will be introduced to this kind of fixed-width modified Booth multipliers. To overcome this problem, several error compensated truncation circuit approaches have been proposed to effectively reduce the truncation error of fixed-width modified Booth multipliers.**

***Keywords*—Arithmetic, Booth Encoder, Compressors, Radix-4,VHDL,Xilinx.**

I. INTRODUCTION

High processing performance and low power dissipation are the most important objectives in many multimedia and digital signal processing (DSP) systems, where multipliers are always the fundamental arithmetic unit and significantly influence the system‟s performance and power dissipation. To achieve high performance, the modified Booth encoding which reduces the number of partial products by a factor of two through performing the multiplier recoding has been widely adopted in parallel multipliers. Moreover, nxn fixed-width multipliers that generate only the most significant product bits are frequently utilized to maintain a fixed word size in these loss systems which allow a little accuracy loss to output data. Significant hardware complexity reduction and power saving can be achieved by directly removing the adder cells of standard multiplier for the computation of the least significant bits of 2n-bit output product. However, a huge truncation error will be introduced to this kind of direct-truncated fixed-width multiplier (DTFM). To effectively reduce the truncation error, various error compensation methods, which add estimated compensation value to the carry inputs of the reserved adder cells, have been proposed. The error compensation value can be produced by the constant Scheme. The constant scheme through had aptively adjusting the compensation value according to the input data at the expense of a little higher hardware complexity. However, most of the adaptive error compensation approaches are developed only for fixed-width array multipliers and cannot be applied to significantly reduce the truncation error of fixed-width modified Booth multipliers directly. To overcome this problem, several error compensation approaches [1]–[3] have been proposed to effectively reduce the truncation error of fixed-width modified Booth multipliers. In [1], the compensation value was generated by using statistical analysis and linear regression analysis. This approach can significantly decrease the mean error of fixed-width modified Booth multipliers, but the maximum absolute error and the mean-square error are still large. [2] divided the truncated part of the bit product matrix of Booth multiplication into a major group and a minor group depending on their effects on the truncation error. To obtain better error performance with a simple error compensation circuit, Booth encoded outputs are utilized to generate the error compensation value. In [3], a systematic design methodology for the low-error fixed-width modified Booth multiplier via exploring the influence of various indices in a binary threshold was developed to decrease the product error. The fixed-width modified Booth multipliers in [2] and [3] achieve better error performance in terms of the maximum absolute error and the mean-square error when compared with the previous published multiplier in [1]. However, their mean errors are much larger than that of [1]. The smaller mean error and mean-square error represent that the error distribution is more symmetric to and centralized in the error equal to zero (denoted as zero error). For many multimedia and DSP applications, the final output data are produced from accumulating a series of products rather than from a single multiplication operation directly. This paper is organized as follows. In section II, the modifisssssed booth multiplier is briefly reviewed. The implementation results and outputs are showed. describes the detailed comparison of booth multiplier and modified booth multiplier. Finally ,section III concludes this paper.

II. PROPOSED LOGIC

Here booth multiplier is going tomodified as Multiplier, partial product, partial product shifter, adder blocks are shown in below figure.

Fig.1. Block diagram of modified booth multiplier

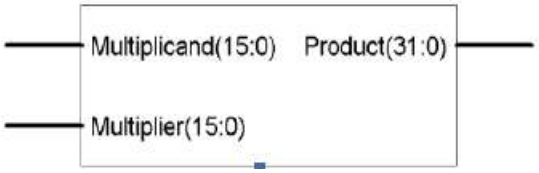

Fig .Block diagram of multiplier

For example:

Multiplicand*: 0110010110101001*

Multiplier : 0000111101010101

Product : 00000110000101101010100000001101

A. Booth multiplier

Conventional array multipliers, like the Braun multiplier and Baugh Woolly multiplier achivecomparatively goodperformance but they require large area of silicon, unlike the add-shift algorithms which require less hardware and exhibit poorer performance. The booth multiplier makes use of booth encoding algorithm in order to reduce the number of partial product by considering two bits of the multiplier at a time ,there by achieving a speed advantage over other multiplier architectures. This algorithm is valid for both signed and unsigned numbers. It accept the number in 2s compliment from, based on radix2 computation

B. Modified booth multiplier

The modified Booth encoding or modified Booth algorithm , was proposed by O. L. Macsorley in 1961 [4]. The recoding method is widely used to generate the partial products for implementation of large parallel multipliers, which adopts the parallel encoding scheme. One of the solutions of realizing high-speed multipliers is to enhance parallelism, w hich helps to decrease the number of subsequent stages. The original version of Booth algorithm (Radix-2) had two drawbacks.

- The number of add subtract operations and the number of shift operations becomes variable and becomes inconvenient in designing parallel multipliers.
- The algorithm becomes inefficient when there are isolated 1 s.

These problems can be overcome by modified Booth algorithm. process three bits at a time during recoding. Recoding the multiplier in higher radix is a powerful way to speed up standard Booth multiplication algorithm. In each cycle a greater number of bits
can be inspected and eliminated therefore, total number of cycles required to obtain products get reduced. Number of bits inspected in radix r is given by n = 1 + log Algorithm for modified booth is given below [5]:
In each cycle of radix-4 algorithm, 3 bits are inspected and two are eliminated. Procedure for implementing radix-4 algorithm is as follows

- Append a 0 to the right of LSB.
- Extend the sign bit 1 position if necessary to ensure that n is even.
- According to the value of each vector, find each partial product.

Y_{2i+1}	Y_{2i}	Y_{2i-1}	Recoded Digit	Operand Multiplication
0	0	0	0	0*Multiplicand
0	0	1	+1	+1*Multiplicand
0	1	0	+1	+1*Multiplicand
0	1	1	+2	+2*Multiplicand
1	0	0	-2	-2*Multiplicand
1	0	1	-1	-1*Multiplicand
1	1	0	-1	-1*Multiplicand
1	1	1	0	0*Multiplicand

C. *Modified booth encoder*

Modified Booth encoding is most often used to avoid variable size partial product arrays. Before designing a MBE, the multiplier B has to be converted into a Prior to convert the multiplier, a zero is appended into the Least Significant Bit of the multiplier. The figure above shows that the multiplier has been divided into four partitions and hence that mean four partial products will be generated using booth multiplier approach Instead of eight partial products being generated using conventional multiplier. **Zn = -2* Bn+1 + Bn + Bn-1** Let‟s take an example of converting an 8-bit number into a Radix-4 number. Let the number be **-36 = 11011100**. Now we have to append a „**0**‟ to the LSB. Hence the new number becomes a 9-digit number that is **110111000**. This is now further encoded into Radix-4 numbers according to the following given table.

Bits A	Bits B	Bits C	operation	X1	X2	Add	Sub
0	0	0	+0	0	0	0	1
0	0	1	+a	0	1	0	1
0	1	0	+a	0	1	0	1
0	1	1	+2a	1	0	0	1
1	0	0	-2a	1	0	1	0
1	0	1	-a	0	1	1	0
1	1	0	-a	0	1	1	0
1	1	1	-0	0	0	1	0

Table 1: Modified booth encoder

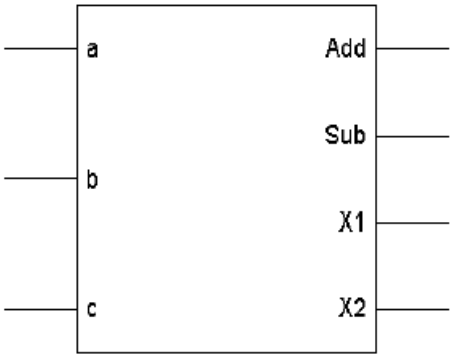

Fig..Block diagram of booth encoder

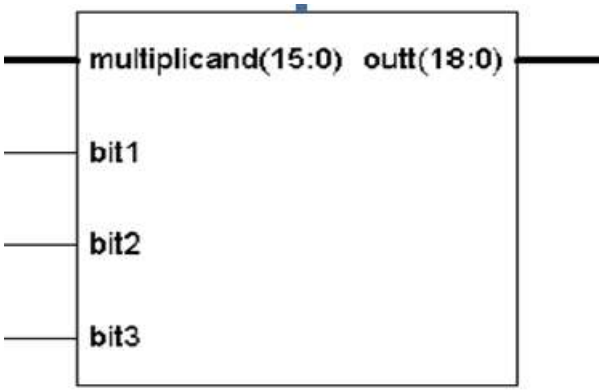

Fig .Block diagram of booth decoder

The decoder block generates the partial product from the selector signals that they are generated in encoder block. Example: Multiplicand = 0110010110101001 Bits = 0110 Out = 1111001101001010

D. Partial product

Partial product generator is the combination circuit of the product generator and the 5 to 1 MUX circuit. Product generator is designed to produce the product by multiplying the multiplicand A by 0, 1, -1, 2 or -2. A 5 to 1 MUX is designed to determine which product is chosen depending on the M, 2M, 3M control signal which is generated from the MBE. For product generator, multiply by zero means the multiplicand is multiplied by "0".Multiply by "1" means the product still remains the same as the multiplicand value. Multiply by "-1" means that the product is the two's complement form number. Multiply by "-2" is to shift left one bit the two's complement of the multiplicand value and multiply by "2" means just shift left the multiplicand by one place.

Fig .Block diagram of partial product

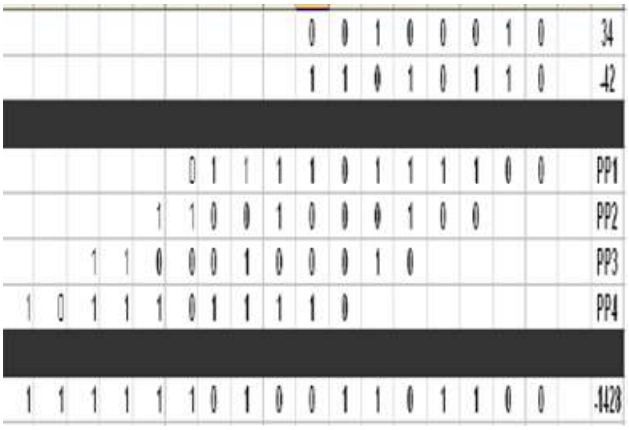

Fig .Example of showing partial product (6-bit)

E. Adder

Fig .Block diagram of adder

Adder takes the inputs performs addition operation and generates sum, carry outputs For example:

X: 00001111000011110101010101010101
Y : 00001111000011110101010101010100
Z:00001111000011110101010101010101

After synthesis	Booth multiplier	Modified booth multiplier
Adders-16	16	-
Subtract-16	15	-
4x1 mux	240	-
No. of slices	500	366
4 i/p LUT	977	644
IOBS	64	64
Combinational delay path	86.70ns	65.96ns
After map		
No. of occupied slices	496	375
4-i/p LUT	992	642
Equivalent gates	9,456	3939
No. of fan-out	6	24
Place &route	64	32
external IOB	496	357
No. of slices		
Power consumed	25Mw	7mW

Table 2: Parameters comparison

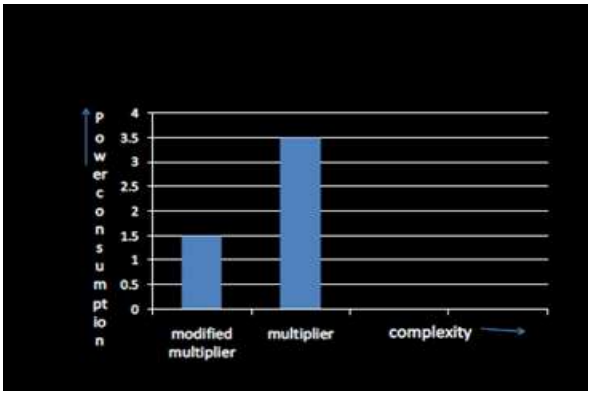

Fig 2 Graph representation of modified multiplier and multiplier

Fig 2 Graph representation of modified multiplier and multiplier in this graph vertical axis is power consumption, horizontal axis is complexity. We know from this graph complexity and power consumption is less in modified booth multiplier, when compared to multiplier. So, modified multiplier is used to save power, complexity is reduced, speed increment can be performed.

III. CONCLUSION

In this paper, FPGA implementation of modified Booth multiplier has been proposed. In the proposed multiplier, the Partial product matrix of Booth multiplication was slightly modified as booth encoder, decoder, and mix. In booth encoder, encoding table is derived from the booth multiplier, according to this table we perform shifting, two's complement in new way. So, modified multiplier is used to save power, complexity is reduced, speed increment can be achieved. When booth multiplier and modified booth multiplier we can save the power up to 40% respectively

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" Mind Reading Computer "

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Abstract-

Mind reading is a type of negative thinking style common among those with Social anxiety disorder (SAD). When you mind read, you believe that you know what other people are thinking about you –for example, that you are socially inept or awkward. Mind reading is a specific type of "probability overestimation," which is a more general term for overestimating the likelihood that negative events. It is also true that when any human being interacts with machines, their mind states changes and this knowledge can be used by machines to take that action. With this idea we can make a mind reading computer which can make his own decision on the bases of human expressions and gestures. The technology of mind reading by the machines is called mind reading computer.

Keyword: interact with machine, Computer, FNIRS, SAD,

XIII. INTRODUCTION

Any human being expresses their feeling and thoughts with his behaviour, states of mind, face expressions and gestures. It is also true that when any human being interacts with machines, their mind states changes and this knowledge can be used by machines to take that action. With this idea we can make a mind reading computer which can make his own decision on the bases of human expressions and gestures. The technology of mind reading by the machines is called mind reading computer. This technology can create a lot of impact on the present technology which mind-blind. So it is very good exercising that when we are not able to take decision than out machine can take those decision. The ability to attribute mental state to other from their behaviour and to use that knowledge to guide our own action and predict those of is known as theory of mind or mind reading.

XIV. BRAIN MACHINE INTERFACE

A brain-machine interface (BMI) is an attempt to mesh our minds with machines. It is a communication channel from a human's brain to a computer, which does not resort to the usual human output pathways as muscles. It is about giving machine-like capabilities to intelligence, asking the brain to accommodate synthetic devices, and learning how to control those devices much the way we control our arms and legs

today. These experiments lend hope that people with spinal injuries will be able to someday use their brain to control a prosthetic limb, or even their own arm. A BMI could, e.g., allow a paralysed patient to convey her/his intentions to a computer program. But also applications in which healthy users can benefit from the direct brain computer communication are conceivable, e.g., to speed up reaction times.

XV. Mind reading is a type of negative thinking style common among those with Social anxiety disorder (SAD). When you mind read, you believe that you know what other people are thinking about you for example, that you are socially inept or awkward. Mind reading is a specific type of "probability overestimation,"

XVI. MIND READING COMPUTER

A computer that can read human minds has unveiled by scientist. It translates thought signals into speech through sensors place on the brain.

XVII. A COMPUTATIONAL MODEL OF MIND-READING

Drawing inspiration from psychology, computer `vision and machine learning, the team in the Computer Laboratory at the University of Cambridge has developed mind-reading machines — computers that implement a computational model of mind-readingto infer mental states of people from their facial signals. The goal is to enhance human-computer interaction through empathic responses, to improve the productivity of the user and to enable applications to initiate interactions with and on behalf of the user, without waiting for explicit input from that user. There are difficult challenges:

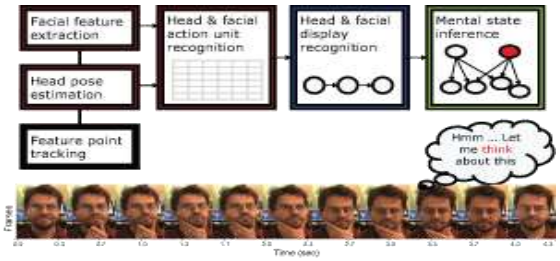

Fig.1. processing stages in the mind read

Using a digital video camera, the mind-reading computer system analyses a person's facial expressions in real time and infers that person's underlying mental state, such as whether he or she is agreeing or disagreeing, interested or bored, thinking or confused.Prior knowledge of how particular mental states are expressed in the face is combined with analysis of facial expressions and head gestures occurring in real time. The model represents these at different granularities, starting with face and head movements and building those in time and in space to form a clearer model of what mental state is being represented. Software from never vision identifies 24 feature points on the face and tracks them in real time. Movement, shape and colour are then analyzed to identify gestures like a smile or eyebrows being raised. Combinations of these occurring over time indicate mental states. The relationship between observable head and facial displays and the corresponding hidden mental states over time is modelled using Dynamic Bayesian Networks. The mind-reading computer system presents information about your mental state as easily as a keyboard and mouse present text and commands. The Affective Computing Group at the MIT Media Laboratory is developing an emotional-social intelligence prosthesis that explores new technologies to augment and improve people's social interactions and communication skills.

WORKING:

XVIII. FIG.2. FUTURISTIC HEADBAND

The mind reading actually involves measuring the volume and oxygen level of the blood around the subject's brain, using technology called functional near-infrared spectroscopy (fNIRS).
The user wears a sort of futuristic headband that sends light in that spectrum into the tissues of the head where it is absorbed by active, blood-filled tissues. The headband then measures how much light was not absorbed, letting the computer gauge the metabolic demands that the brain is making. The results are often compared to an MRI, but can be gathered with light weight, non-invasive equipment.

fig.3. mind reading computer

Wearing the fNIRS sensor, experimental subjects were asked to count the number of squares on a rotating onscreen cube and to perform other tasks. The subjects were then asked to rate the difficulty of the tasks, and their ratings agreed with the work intensity detected by the fNIRS system up to 83 percent of the time. "We don't know how specificwe can be about identifying users' different emotional states," cautioned Sergio Fantini, a biomedical engineering professor at Tufts. "However, the particular area of the brain where the blood-flow change occurs should provide indications of the brain's metabolic changes and by extension workload, which could be a proxy for emotions like frustration.""Measuring mental workload, frustration and distraction is typically limited to qualitatively observing computer users or to administering surveys after completion of a task, potentially missing valuable insight into the users' changing experiences. Preliminary results show that using button-sized sensors, which attach under the chin and on the side of the Adam's apple, it is possible to pick up and recognize nerve signals and patterns from the tongue and vocal cords that correspond to specific words.

XIX. ADVANTAGES AND USES

Mind Controlled Wheelchair

This equipment is little different from the Brain-Computer Typing machine, this thing works by mapping brain waves when you think about moving left, right, forward or back, and then assigns that to a wheelchair command of actually moving left, right, forward or back. The result of this is that you can move the wheelchair solely with the power of your mind. This device doesn't give you mind bullets (apologies to Tenacious D) but it does allow people who can't use other wheelchairs get around easier. In everyday life, they could even be used to communicate on the sly - people could use them on crowded buses without being overheard .The finding raises issues about the application of such tools for screening suspected terrorists -- as well as for predicting future dangerousness more generally. We are closer than ever to the crime-prediction technology of *Minority Report*.The day when computers will be able to recognize the smallest units in the English language—the 40-odd basic sounds (or phonemes) out of which all words or verbalized thoughts can be constructed. Such skills could be put to many practical uses. The pilot of a high-speed plane or spacecraft, for instance, could simply order by thought alone some vital flight information for an all-purpose cockpit display. There would be no need to search for the right dials or switches on a crowded instrument panel. The initial success "doesn't mean it will scale up", he told New Scientist. "Small-vocabulary, isolated word recognition is a quite different problem than conversational speech, not just in scale but in kind."

APPLICATION:

- Help paralytic patient
- Help handicapped people
- Help comma patient
- Help people who cant speak
- Can be use for military purposes and sting operation
- Eliminate the capability to lie

Conclusion

Tufts University researchers have begun a three-year research project which, if successful, will allow computers to respond to the brain activity of the computer's user. Users wear futuristic-looking headbands to shine light on their foreheads, and then perform a series of increasingly difficult tasks while the device reads what parts of the brain are absorbing the light. That info is then transferred to the computer, and from there the computer can adjust its interface and functions to each individual.

One professor used the following example of a real world use: "If it knew which air traffic controllers were overloaded, the next incoming plane could be assigned to another controller."

Hence if we get 100% accuracy these computers may find various applications in many fields of electronics where we have very less time to react.

XX. FUTURE SCOPE

- It is use to control wheelchair by mind
- Brain computer typing machine by thinking about left and right hand movement user can control the virtual keyboard

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To Study and Analyse Different Type's of Multipliers

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***Abstract*— There are different entities that one would like to optimize when designing a VLSI circuit. These entities can often not be optimized simultaneously, only improve one entity at the expense of one or more others can be the target. The design of an efficient multiplier circuit in terms of power, area, and speed simultaneously, has become a very challenging problem.**

In Very Large Scale Integration, low power VLSI design is necessary. Multiplication occurs frequently in finite impulse response filters, fast Fourier transforms, convolution, and many other important DSP systems.

The objective of a good multiplier is to provide a physically compact, good speed and low power consuming chip. To save significant power consumption of a VLSI design, it is a good direction to reduce its dynamic power that is the major part of total power dissipation. In this paper, we made a performance wise comparison of different multipliers. The booth multiplier will reduce the number of partial products generated by a factor of 2. The adder will avoid the unwanted addition and thus minimize the switching power dissipation. This paper presents study of an efficient implementation of high speed multiplier like serial multiplier, parallel multiplier, array multiplier, shift & add multiplier, Booth multiplier. Here we compare the working of these multipliers in order to find a better option.

Keywords —**Different Multiplier**

XXII. INTRODUCTION

Multipliers play an important role in today's digital signal processing and various other applications. With advances in technology, many researchers have tried and are trying to design multipliers which offer either of the following design targets – high speed, low power consumption, regularity of layout and hence less area or even combination of them in one multiplier thus making them suitable for various high speed, low power and compact VLSI implementation.

The common multiplication method is "add and shift" algorithm. In parallel multipliers number of partial products to be added is the main parameter that determines the performance of the multiplier. To reduce the number of partial products to be added, Modified Booth algorithm is one of the most popular algorithms. the amount of shifts between the partial products and intermediate sums to be added will increase which may result in reduced speed, increase in silicon area due to irregularity of structure and also increased power consumption due to increase in interconnect resulting from complex routing. On the other hand "serial-parallel" multipliers compromise speed to achieve better performance for area and power consumption. The selection of a parallel or serial multiplier actually depends on the nature of application. In this seminar we introduce the multiplication algorithms and architecture and compare them in terms of speed, area, power and combination of these metrics.

XXIII. RELATED WORK

Research of Multiplier in 1951 by Y.Sangmitra it begins with a multiplication of two no.i.e multiplicand & multiplier then its result produce the partial product. The most basic form ofmultiplier consists of forming the product of two binarynumbers. This may be accomplished through successive addition and shifts in which each addition is condition on one of the multipler bit.

Jayasharee Taralabenchi,kavana Hegde,Soumya Hegde,Siddalingesh S.Navalgund,"Implimentation of binary multiplication using Booth and Systolic Algorithm on FPGA ,using VHDL", International Conference & Workshop on Recent Trend s in Technology,(TCET) 2012.Compare the power consumption of the multiplier we find that serial multipliers consume more power. So where power is an important criterion there we should prefer parallel multiplier like booth multiplier to serial multipliers.

High performance systems such as microprocessors,digital signal processors, filters, ALU etc. which is need of hour now days requires a lot of components. One of main component of these high performance system is multiplier.

WHAT IS MULTIPLIER?

Multiplication is one of the basic functions used in digital signal processing (DSP). It requires more hardware resources and processing time than addition and subtraction. In fact, 8.72% of all instructions in a typical processing unit is multiplier. The multiplier is a fairly large block of a computing system. The amount of circuitry

involved is directly proportional to square of its resolution i.e., a multiplier of size of n bits has O (n2) gate.

The most basic form of multiplier consists of forming the product of two binary numbers. This may be accomplished through successive additions and shifts in which eachaddition is condition on one of the multiplier bit as shown below:

```
Multiplicand          A3   A2   A1   A0
Multiplier            B3   B2   B1   B0
                    ------------------
Partial product :     A3B0 A2B0 A1B0 A0B0
                 A3B1 A2B1 A1B1 A0B1
            A3B2 A2B2 A1B2 A0B2
       A3B3 A2B3 A1B3 A0B3
    ------------------------------------
    P8  P7  P6   P5   P4   P3   P2   P1
    ------------------------------------
```

BASIC OF MULTIPLIER:

1. *Basic binary multiplier:*

The operation of multiplication is rather simple in digital electronics. It has it's origin from the classical algorithm for the product of two binary numbers. This algorithm uses addition and shift left operations to calculate the product of two numbers.

2. *Partial product generation:*

Partial product generation is the very first step in binary multiplier. These are the intermediate terms which are generated based on the value of multiplier. If the multiplier bit is '0', then partial product row is also zero, and if it is '1', then the multiplicand is copied as it is. From the 2nd bit multiplication onwards, eachpartial product row is shifted one unit to the left as shown in the above mentioned example.

NEED OF MULTIPLIER

1. The design of an efficient multiplier circuit in terms of power, area, and speed simultaneously.

2. The need of multiplier is increasing the high
speed of processor.

TYPE OF MULTIPLIERS

Multipliers are categorized relative to their applications, architecture and the way the partial products are produced and summed up. Based on all these, a designer might find following types of multiplier

A. SERIAL MULTIPLIER

B. PARALLEL MULTIPLIER

C. ARRAY MULTIPLIER

D. SHIFT AND ADD MULTIPLIER

E. BOOTH MULTIPLIER

A) SERIAL MULTIPLIER

Serial multiplier is the partial products are added serially then serial adder is used with least hardware. serial multiplier is used as area and power is of utmost important and delay can be tolerated . This circuit uses one adder to add the m * n partial products. The circuit is shown in the fig. below for m=n=4. Multiplicand and Multiplier inputs have to be arranged in a special manner synchronized with circuit behaviour as shown on the figure. The inputs could be presented at different rates depending on the length of the multiplicand and the multiplier. Two clocks are used, one to clock the data and one for the reset. A first order approximation of the delay is O (m,n). With this circuit arrangement the delay is given as D =[(m+1)n + 1] tfa.

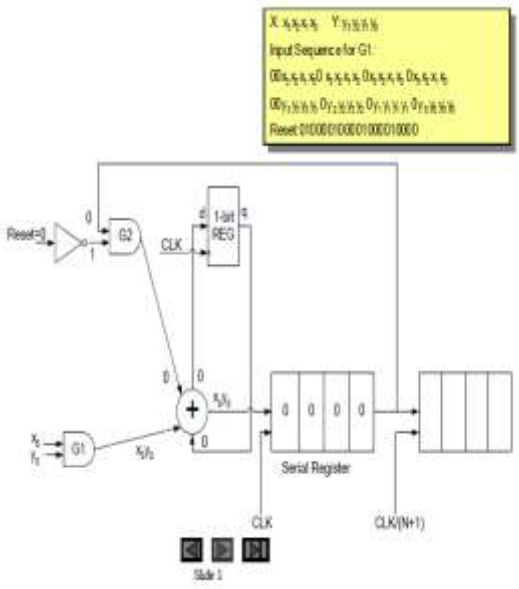


Figure1: structure of serial multiplier

As shown the individual PP is formed individually. The addition of the PPs are performed as the intermediate values of PPs addition are stored in theDFF, circulated and added together with the newly formedPP.This approach is not suitable for large values of M or N.

B) SERIAL/PARALLEL MULTIPLIER

The multiplier uses the serial-parallel method of addition to calculate the result of multiplying two 8-bit numbers as shown in figure 2.1 below. The multiplier receives the two operands A and B and outputs the result C. Operands A and B are loaded in parallel into 8-bit registers and the result C is shifted into a 16-bit register. Multiplication begins on the assertion of a START signal and once the calculation is complete a STOP signal is asserted.

The serial-parallel multiplier is based on the addition of bits in the corresponding column of the multiplication process as shown below. Each column is added in one clock cycle generating the corresponding bit. The resulting bit is then shifted into output register. Therefore the entire multiplication process for the 8 by 8-bit multiplier requires 16 clock cycles to complete the calculation.

```
a1a0
x b1b0
--------------------------------
a1b0 a0b0
a1b1 a0b1
--------------------------------
a1b1 (a1b0 + a0b1) a0b0
```

The block diagram for the multiplier is shown in figure below. The first operand, A, is loaded in parallel and the most significant bit is shifted out during each clock cycle. Operand B is also loaded in parallel and its value is stored in the register for the entire multiplication process. The result C is generated by shifting the added bits of each column one by one into the resultant register. Therefore register RA is a parallel load shift register, RB is a parallel load parallel output register, and RC is a serial input parallel output register.

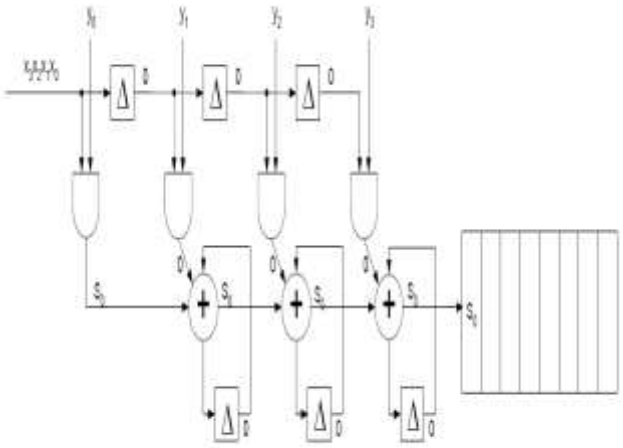


Figure2: Structure of Serial/Parallel

C) ADD AND SHIFT MULTIPLIER

Shift-and-add multiplication is similar to the multiplication performed by paper and pencil. This method adds the multiplicand *X* to itself *Y* times, where *Y* denotes the multiplier. To multiply two numbers by paper and pencil, the algorithm is to take the digits of the multiplier one at a time from right to left, multiplying the multiplicand by a single digit of the multiplier and placing the intermediate product in the appropriate positions to the left of the earlier results. As an example, consider the multiplication of two unsigned 4-bit numbers, 8(1000) and 9 (1001).

```
Multiplicand        1000 X
Multiplier          1001
                    1000
                   0000
                  0000
                 1000
Product          1001000
```

In the case of binary multiplication, since the digits are 0 and 1, each step of the multiplication is simple. If the multiplier digit is 1, a copy of the multiplicand (1* multiplicand) is placed in the proper positions; if the multiplier digit is 0, a number of 0 digits (0* multiplicand) are placed in the proper positions. Consider the

multiplication of positive numbers. The first version of the multiplier circuit, which implements the shift-and-add multiplication method for two *n*-bit numbers, is shown in Figure.

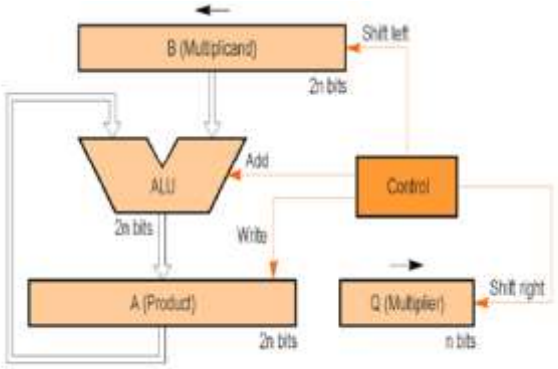


Figure 3. The first version of the multiplier circuit.

The 2*n*-bit product register (*A*) is initialized to 0. Since the basic algorithm shifts the multiplicand register (*B*) left one position each step to align the multiplicand with the sum being accumulated in the product register, we use a 2*n*-bit multiplicand register with the multiplicand placed in the right half of the register and with 0 in the left half. Figure 3.12 shows the basic steps needed for the multiplication.

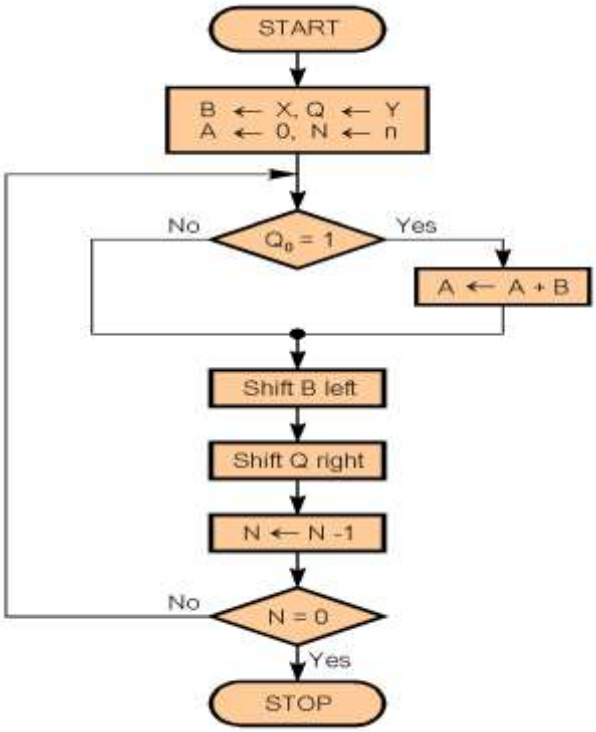


Figure 4. The first version of the multiplication algorithm.

Figure 4. shows the basic steps needed for the multiplication. The algorithm starts by loading the multiplicand into the *B* register, loading the multiplier into the *Q* register, andinitializing the *A* register to 0. The counter *N* is initialized to *n*. The least significant bit of the multiplier register (*Q*0) determines whether the multiplicand is added to theproduct register. The leftshift ofthe multiplicand has the effect of shifting theintermediate products to the left, just as when multiplying by paper and pencil. The right shift of the multiplier prepares the next bit of the multiplier.

ARRAY MULTIPLIERS:

Array multiplier is well known due to its regular structure. Multiplier circuit is based on add and shift algorithm. Each partial product is generated by the multiplication of the multiplicand with one multiplier bit. The partial product are shifted according to their bit orders and then added. The addition can be performed with normal carry propagate adder. N-1 adders are required where N is the multiplier length.

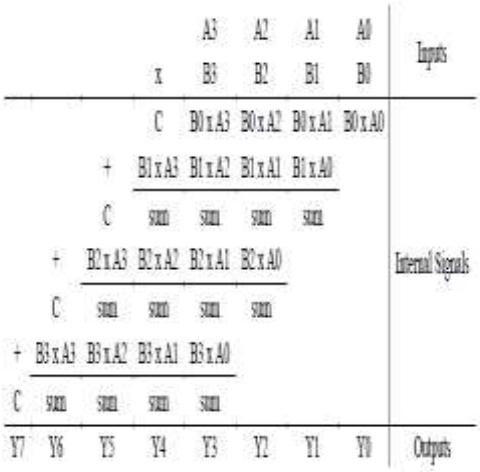
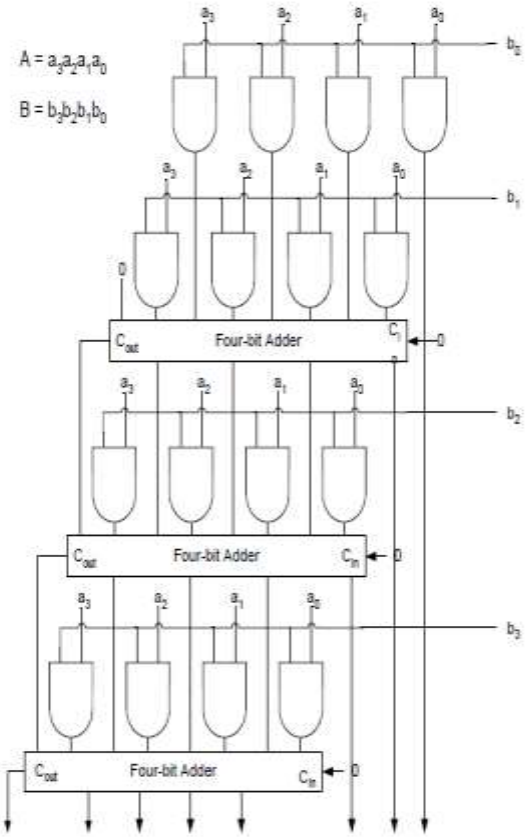


Figure 5: Structure of array multiplier

An example of 4-bit multiplication method is shown below:



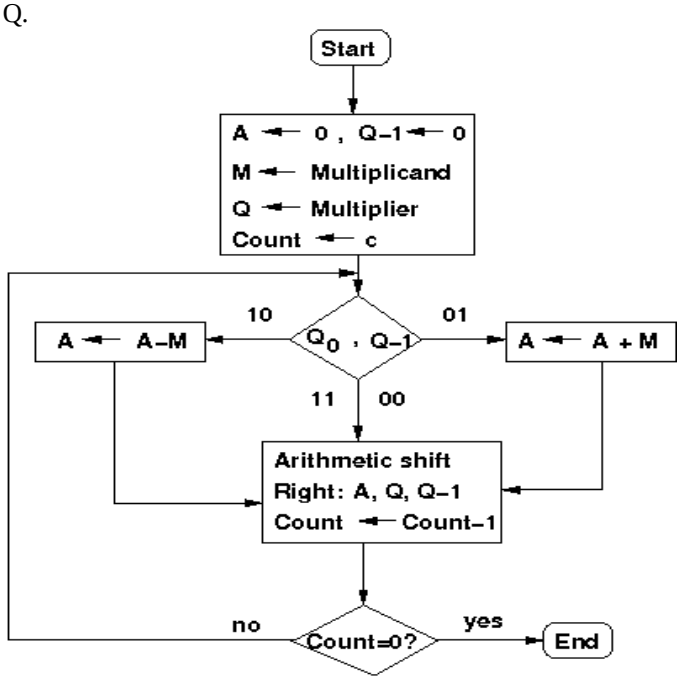
Product(a*b)

Although the method is simple as it can be seen from this example, the addition is done serially as well as in parallel. To improve on the delay and area the CRAs are replaced with Carry Save Adders, in which every carry and sum signal is passed to the adders of the next stage. Final product is obtained in a final adder by any fast adder (usually carry ripple adder). In array multiplication we need to add, as many partial products as there are multiplier bits.

BOOTH MULTIPLIER

It is a powerful algorithm for signed-number multiplication, which treats both positive and negative numbers uniformly. For the standard add-shift operation, each multiplier bit generates one multiple of the multiplicand to be added to the partial product. If the multiplier is very large, then a large number of multiplicands have to be added. In this case the delay of multiplier is determined mainly by the number of additions to be performed. If there is a way to reduce the number of the additions, the performance will get better.

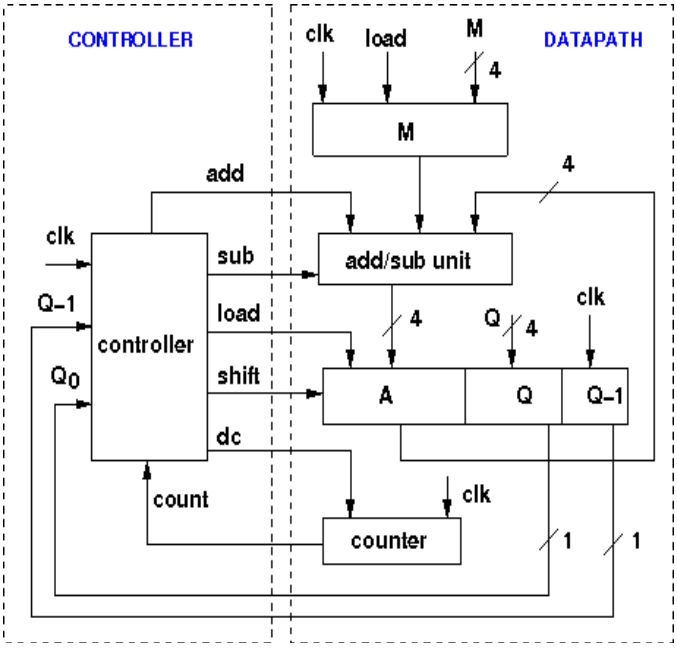
Booth algorithm is a method that will reduce the number of multiplicand multiples.The multiplicand and multiplier are placed in the m and Q registers respectively. A 1 bit register is placed logically to the right of the LSB (least significant bit) Q0 of Q register. This is denoted by Q-1. A and Q-1 are initially set to 0. Control logic checks the two bits Q0 and Q-1. If the twi bits are same (00 or 11) then all of the bits of A, Q, Q-1 are shifted 1 bit to the right. If they are not the same and if the combination is 10 then the multiplicand is subtracted from A and if the combination is 01 then the multiplicand is added with A. In both the cases results are stored in A, and after the addition or subtraction operation, A, Q, Q-1 are right shifted. The shifting is the arithmetic right shift operation where the left most bit namely, An-1 is not only shifted into An-2 but also remains in An-1. This is to preserve the sign of the number in A and Q. The result of the multiplication will appear in the A and Q.



Design issues:

Booth's algorithm can be implemented in many ways. This experiment is designed using a controller and a datapath. The operations on the data in the datapath is controlled by the control signal received from the controller. The datapath contains registers to hold multiplier, multiplicand, intermediate results, data processing units like ALU, adder/subtractor etc., counter and other combinational units. Following is the schemetic diagram of the Booth's multiplier which multiplies two 4-bit numbers in 2's complement of this experiment. Here the adder/subtractor unit is used as data processing unit.M, Q, A are 4-bit and Q-1 is a 1-bit rigister. M holds the multiplicand, Q holds the multiplier, A holds the results of adder/subtractor unit. The counter is a down counter which counts the number of operations needed for the multiplication. The data flow in the data path is controlled by the five control signals generated from the controller. these signals are load (to load data in registers), add (to initiate addition operation),

sub (to initiate subtraction operation), shift (to initiate arithmetis right shift operation), dc (this is to decrement counter). The controller generates the control signals according to the input received from the datapath. Here the inputs are the least significant Q0 bit of Q register, Q-1 bit and count bit from the down counter.



ADVANTAGE OF MULTIPLIER

1. In VLSI system used in different multiplier to reduce the partial product & delay.
2. Booth algorithm is a method that will reduce the number of multiplicand multiples.
3. Booth multiplier is faster than other multiplier.
4. It is the powerful algorithm for sign number multiplication, which treats both positive & negative uniformly.

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❖ *IMPLICATION*

1. Multipliers are extensively used in microprocessor, DSP and communication applications.
2. Higher throughput arithmetic operations are important to achive the desired performance in many real time signal and image processing application.
3. Multiplier used in the biomedical signal processing.
4. Multipliers are now required in cryptographic & error correction circuit.

CONCLUSION

This paper gives a clear concept of different multipliers.Multipliers are one the most important componentof many systems. Different multipliers are compared from the result of power consumption and total area.

Multipliers are used to speed up the calculation and makes the system faster.

Performance of multipliers is one of the most important aspect in the system performance. So always there is a great need to find a better solution in case of multipliers. Thegreat research is going on for finding the multipliers that consume less power with maintaining the speed of operation.

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"Wirelessly Powered and Remotely Controlled mm Sized Locomotive Implant"

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ABSTRACT:-
The implantable device that is wirelessly powered and controlled for locomotion in a fluid medium is presented. To improve in an order of magnitude for existing methods in terms of thrust conversion efficiency, the two scalable low-power propulsion methods are described. The wireless prototype occupies 0.6mm×1mm in 65 nm CMOS with an external 2mm×2mm receiver antenna. The IC consists of a matching network, a rectifier, a bandgap reference, a regulator, a demodulator, a digital controller, and high-current drivers that interface directly with the propulsion system. It receives 500 µW from a 2 W 1.86 GHz power signal at a distance of 5 cm. Asynchronous pulse-width modulation on the carrier allows for data rates from 2.5–25 Mbps with energy efficiency of 0.5 pJ/b at 10 Mbps. The received data configures the propulsion system drivers, which are capable of driving up to 2 mA at 0.2 V and can achieve speed of 0.53 cm/sec in a 0.06 T magnetic field.

Keywords —Biomedical telemetry,implantable biomedical devices, low power, micro-scale fluid propulsion, non-invasive, wireless health monitoring, wireless powering.

Introduction-

Invention in implantable devices that are capable of in vivo controlled motion can serve a variety of existing applications, and they also open up new possibilities for emerging non-invasive medical technologies. Drug delivery is an especially attractive application, as drugs can be precisely targeted to problematic regions with minimal disturbance to the rest of the body. Additionally, precision guidance through fluid cavities couldenhance both endoscopic and cardiac procedures that currently rely on catheter systems, such as angioplasty and coronary stent treatments, cardiac arrhythmia ablation surgeries, and diagnostic techniques like endo-myocaridial biopsies. Heart disease is the leading cause of death, and this technology could improve the effectiveness of these procedures as well as reducing costs. with this enhancements and cost reductions ,it is possible to develope new non- invasive procedures for cardiac care or endoscopy that can aid in prevention, early detection, and treatment of a variety of conditions.fig1shows the conceptual operation of the prototype travelling through the bloodstream with MHD propulsion.

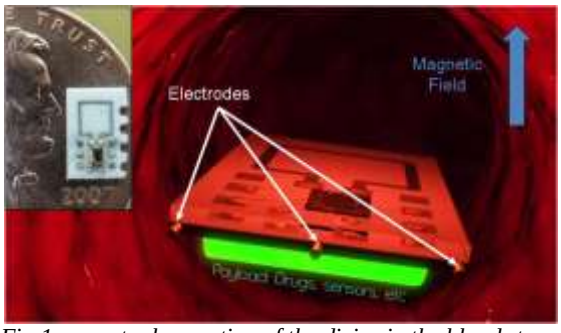


Fig.1conceptual operation of the divice in the blood stream
The section I present the analysis and stimulation of the fluid propulsion method best on Lorentz forces.section II Describes the design of the wireless power transmission system.

III. ELECTROMAGNETIC PROPULSION

Propulsion for implantable devices has not been possible because of the high power requirement for mechanical de- signs, and the high complexity of passive magnetic designs. Our prior work based on Lorentz forces demonstrates two methods with significant advantages over existing techniques in terms of power efficiency, scalability, and controllability . The first method drives current directly through the fluid usingmagneto-hydrodynamic (MHD), and the second switches current in a loop of wire to oscillate the device, which experiences asymmetric drag fluid forces. In both methods, the force is proportional to current, and therefore maximizing current will maximize the speed. Fig.2 shows the operation of magneto-hydrodynamic(MHD) Propulsion.

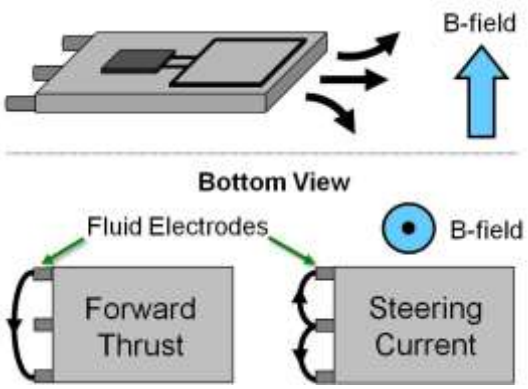


Fig.2 operation of magneto-hydrodynamic (MHD) propulsion

A. Magneto-hydrodyanmic (MHD) Propulsion
MHD propulsion drives electric currents through fluids, so the efficiency of this method depends on the fluid conductivity. The basic principle of motion is described in Fig. 2. The conductivity of The thrust force for MHD propulsion is the Lorentzforce on the

current flowing through the fluid. These forces are given in the equation below, where I is the current in the wire, L is a vector denoting the length and direction of the wire, and B is the background magnetic field:

$$F = I L \times B$$

II. WIRELESS CHIP ARCHITECTURE

The purpose of the chip was to create a wireless prototype that demonstrates the effectiveness of the propulsion system at the mm-scale. The specifications were derived from the requirements of the propulsion methods, which need approximetly 1mA of current for cm/sec speeds. network, a charge- pump connected rectifier, a regulator, a bandgap reference circuit, a demodulator, a digital controller, and configurable electrode drivers. There are no external components except for the receiving antenna.

A. Antenna and Matching Network

The antenna dominates the size of the prototype, and is implemented with a 2mm×2mm loop on a PCB using Rogers 4350 substrate. External components are not possible due to size constraints, so a balanced L-match consisting of only capacitors was implemented because on-chip inductors have significant loss and occupy large area

B. Start-up and Power-on Reset Circuits

Start-up circuitry for the initial power-on is necessary to ensure that the antenna impedance maintains a match and that the chip enters a knownstate. A start-up 1network that turns on a pass transistor for the digital supply voltage is shown in

C. Power Management

When the antenna receives 500 µW, the RF input voltage to the rectifier is 350 mV. Conventional diode-capacitor ladder rectifiers suffer from low efficiency at low input voltage. Therefore, charge-pump connected self-driven synchronous rectifiers (SDSR) based on] are used with low-VT Devices.

D. Clock and Data Recovery

The low modulation depth and fluctuating input power make it impossible to use a fixed reference voltage for the ASK threshold detector. Instead, a dynamic reference voltage is generated concurrently with envelope detection

E. Controller

The digital controller receives data and clock signals from the demodulator, and configures the propulsion system drivers and the adaptive loading network. Data transmission begins with a 5-bit prefix that, when received, enables a shift register to begin accepting the 55-bit data packet

F. Configurable High-Current Drivers

The chip has 6 high-current electrode drivers with configrable strength to accommodate both propulsion mechanisms. Each of the drivers can be independently set to propulsion from the fristrectifire, ground, or left floating.

I V. EXPERIMENTAL VERIFICATION

The Experimental test verified all the elements of the design including wireless power transmission, the ASK-PWM data transfer the analog and digital Circuitry ,and the two propulsion schemes.

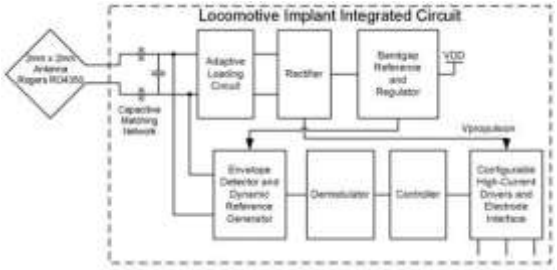


Fig. Integrated circuit architecture

A. Wireless Power Transmission

The transmitter consists of a signal generator , a high-frequency amplitude modulator, a power amplifier, and a 4cm×4cm loop antenna fabricated on PCB. The IC was wire bonded to a 2mm×2mm antenna fabricated on a Rogers 4350 substrate to minimize RF losses. The measurements are shown in fig4.

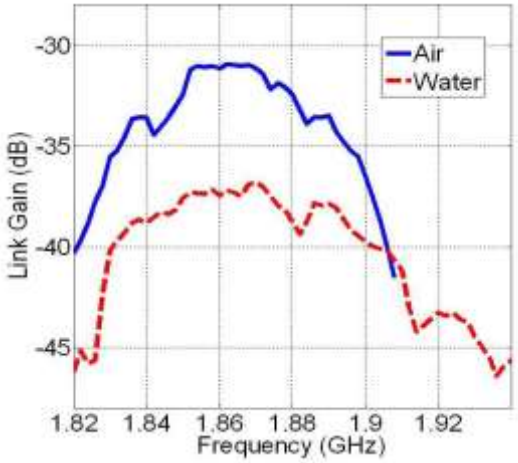
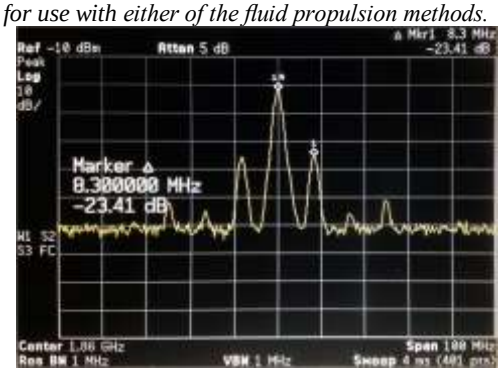


Fig4 -Measured link gain in air and water

B. ASK-PWM Data Transfer

C. Fluid Propulsion

The IC was designed to function with either of the described fluid propulsion mechanisms. The chip and receive antenna are encapsulated in RF-transparent epoxy to protect them from the fluid. The leads from the electrodes are exposed to adapt the device for use with either of the fluid propulsion methods.



The setup for asymmetric fluid drag propulsion is verysimilar to MHD propulsion. The device is connected to 40loops of wire, which are oriented to oscillate it. The prototypehas an attached fin that experiences asymmetric fluid dragwhen oscillating. By changing the orientation of the magneticfield, the device can

oscillate along the surface of the water, orinto and out of the water.

V. CONCLUSION

In this work, we have demonstrated a fully wireless 3mm×4mm prototype capable of controlled motion in a fluid environment, requiring only a static background magnetic field generated from permanent magnets. The device is wirelessly powered and operates with approximately 250 µW, and travels controllably at 0.53 cm/sec in a 0.06 T field. Additionally, data transfer is fast and efficient, achieving rates of 25 Mbps and consuming only 0.5 pJ/bit at 10 Mbps. These devices can serve as a versatile tool for a variety of medical treatments that require precise guidance including drug delivery, diagnostics, and cardiac catheter treatments..

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[4] D. Pivonka, T. Meng, and A. Poon, "Translating electromagnetic torqueinto controlled motion for use in medical implants," in Engineeringin Medicine and Biology Society (EMBC), 2010 Annual InternationalConference of the IEEE, 31 2010-sept. 4 2010, pp. 6433 – 6436*Fig.-Spectrum of the 1.86 GHz carrier modulated at 9% depth with an 8.3MHz clock.*

Alive Human Detector

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***Abstract*— Natural calamities do occur and they are unstoppable. But humans are becoming increasingly aware in the concept of intelligent rescue operations in such calamities so that precious life and material can be saved though calamities cannot be stopped. Still there are lots of disasters that occur all of a sudden and Earthquake is one of such things. Earthquakes produce a devastating effect and they see no difference between human and material. Hence a lot of times humans are buried among the debris and it become impossible to detect them. A timely rescue can only save the people who are buried and wounded. Detection by rescue workers becomes time consuming and due to the vast area that gets affected it becomes more difficult. So the concept proposed helps in identifying the position of alive people and rescue operations.**

A hardware prototype of the life detection system has been developed and experimental results show that the proposed method is cost effective and efficient method which not only detects life signals but also the identifies people in a given area, to facilitate rescue team operations in case of emergencies. By the advent of this system, the world death rate as a cause of natural disasters like earthquake may decrease to greater extent. In line with this philosophy, one of the most challenging parts of this project is to find a lightweight and low cost solution that can fit on human body.

Keywords —**life detection, alive human detector, USART, FLIR.**

XXIV. INTRODUCTION

There are many different kinds of catastrophe in natural and man-made disaster like earthquake, flooding, hurricane and they cause different disaster area like collapsed building, landslide or crater. During these emergency situations, and especially in urban disaster, many different people are deployed (policeman, fire fighters and medical assistance). They need to cooperate to save lives, protect structural infrastructure, and evacuate victims to safety. In these situations, human rescuers must make quick decisions under stress, and try to get victims to safety often at their own risk. They must gather determine the location and status of victims and the stability of the structures as quickly as possible so that medics and fire fighters can enter the disaster area and save victims. All of these tasks are performed mostly by human and trained dogs, often in very dangerous and risky situations. This is why since some year; mobile robots have been proposed to help them and to perform tasks that neither human dogs nor existing tools can do. For this project, we will focus only sensors which will work in a disaster environment of manmade structure, like collapsed buildings. They are called Urban Search and Rescue operation.

There are several teams working on Human body. Currently, Mellon University is being found by the National Science Foundation to investigate the use of semi-autonomous robots for urban search and rescue. These Sensors will assist firemen, police, and disaster agencies with reconnaissance, site evaluation, and human detection. The goal of this research is to develop hardware sensors and software systems (user interfaces and navigation, planning and coordination module) to support these tasks. Compare to the other projects, Team is capable of navigating the difficult terrain of a disaster site but lacks sensors for victim detection. The contribution of this work is to provide a sensor suite for human detection in the urban disaster environment.

The philosophy of the USAR project at Carnegie Mellon is that the robot team should be low cost, semi-autonomous, heterogeneous, and work together under a human coordinator. In line with this philosophy, one of the most challenging parts of this project is to find a lightweight and low cost solution that can fit on human body. Conditions in a disaster area are extreme with many unknown parameters. Victims may be covered in debris, trapped in voids, or entombed, making it difficult to find them and determine their state of health. This is why it will be important to choose a set of different sensors which are complementary and able to operate in these conditions.

The selected sensors will be integrated with military. This involved developing hardware and low level data acquisition software solutions. Tests will be used to determine the robustness, limitations, and accuracy of each sensor and this data will be used to develop a comprehensive system that fuses the information from all the sensors to determine the location and probability of human presences.

XXV. LITERATURE REVIEW

In this section, we will discuss the work done in the area of human detection so far. Many universities in USA, Japan and Europeare purchasing urban search and rescue robotics. Three of the most advanced research teams are discussed in this paper:

A. CRASAR (Centre for Robot-Assisted Search and Rescue)

Steve Burien suggested on Human Detection for Robotic Urban Search and Rescue university of South Florida That is may be the most advanced project for a search and

rescue robot [1]. The aim of this robot is to help the first-aid workers by giving them a picture of a place that they cannot reach. So they can see the environment, see if there are victims, or something else. This robot was used for first time in real conditions on 11th September 2001 in the World Trade Center disaster [1].

Fig.1: Jackpot robot after the World Trade Centre

This robot use different sensor like millimeter wave radar for measuring distance, a camera for vision and a forward-looking infrared camera (FLIR) for the human heat detection [7]. Another new sensor has just been implemented on this robot recently. This is aSpO2 sensor to measure the oxygen quantity in blood. Then the user will be able to know if the victim is still alive. This robot is totally operated with a human. It sends its information to the user to allow him to take decision and to drive the robot in an interesting place.

B. Utility Vehicle for Search:

Researchers from Kobe University have several homogeneous small robots that can link together to form a large robot in order to climb large obstacles. Most of their research appears to be focused [2] on large scale coordination efforts such as disaster relief after the Hanshin-Awaji Earthquake that hit Kobe City in 1995 refer in [2]. They have also developed a simulator for Robot Cup-Rescue Simulation league emphasizes coordination rather than victim detection and issues individual robots must solve.

Fig. 2: Utility Vehicle for Search

Developing snake robots for exploration of small space in disaster sites. They are designed so that they can be dismantled into many parts for transportation to the site though their mobility in a disaster area is somewhat limited. The snake robots are equipped only with a camera and microphone and do not seek to detect victims autonomously.

C. iRobot:

US Government developed some robots which replace the human in several interventions, when it is too dangerous or too small to enter. They have many different projects. Some robots are used exploration in urban or outside places. Jackpot robot for example has an aluminium body and it has different sensors like, cameras, microphones, laser range finders, Sonar and IR sensors [6].

Fig. 3: Robots from iRobot

Another project is deployed, which has a team of little robots that it can place where it wants. This robot has the calculation power of a big robot and the flexibility and mobility of little ones .In the future, these robots will help victims and give them the first aid rescue, like give morphine using an auto-injector or information via a bilateral radio [3].

D. Urban robot:

In the NASA's Jet Propulsion laboratory, they have done some research to avoid earthquake for an urban robot with different sensors mounted on it (stereo camera, IR distance sensor, GPS) in [4].

XXVI. METHODOLOGY

This project consists of three main parts. The first step is to determine the state of the art in which special emphasis is given on sensors for victim detection. Next, a set of appropriate and complementary sensors are selected in

accordance with chosen criteria mainly that the sensors have to be low-cost and lightweight.

Fig. 5 shows the block diagram of the proposed methodology.

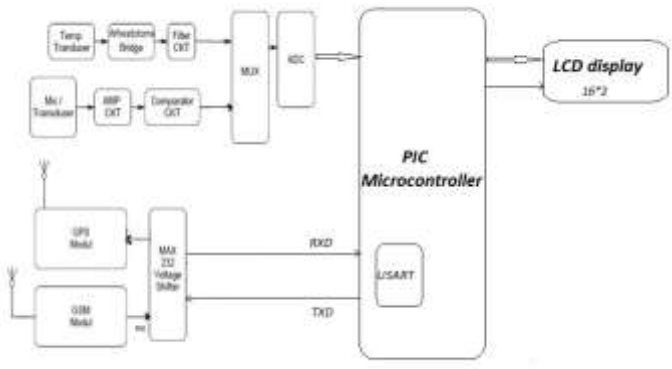

Fig 5.Alive human detector

The Alive human detector work on three main sections these are as:

A. *Input section:*

In an input section, the temperature transducer is used to detect the temperature of human body. After detecting the temperature, Wheatstone bridge changes the resistance according to which current and in voltage parameter changes. These parameters are applied to thefilter circuit to convert them into acceptable input for ADCwhich converts them into digital form. For this purpose, we need ADC of PIC microcontroller.

Analog-to-digital conversion is an electronic process in which a continuously variable signal is changed, without altering its essential content; into a multi-level (digital) signal. The input to an analog-to-digital converter (ADC) consists of a voltage that varies among a theoretically infinite number of values. Examples are sine waves, the waveforms representing human speech, and the signals from a conventional television camera. The output of the ADC, in contrast, has defined levels or states. The number of states is almost always a power of two -- that is, 2, 4, 8, 16, etc. The simplest digital signals have only two states, and are called binary. All whole numbers can be represented in binary form as strings of ones and zeros.

Microcontroller executesthe program of transmission of serial data over a long display communication by usingUSART microcontroller and GSM module.

B. *Monitor Section:*

In a monitor section, we are able to display temperature of human body in simple visualBasic display software of GSM module.GSM (Global System for Mobile Communications) is a low-cost hardware equipment to create a system for remote monitoring and remote control. The system can be controlled and monitored via Short Message Service (SMS) from anywhere that covered by GSM (Global System for Mobile Communications) service.

A GSM network is composed of several functional entities, whose functions and interfaces are of a generic GSM network. The GSM network can be divided into three broad parts. The Mobile Station is carried by the subscriber. The Base Station Subsystem controls specified. Figure 1 shows the layout the radio link with the Mobile Station. The Network Subsystem, the main part of which is the Mobile services Switching Center (MSC), performs the switching of calls between the mobile users, and between mobile and fixed network users. The MSC also handles the mobility management operations.

C. *Detection Section:*

In this section, we are able to detect whether the body is alive or not. The mic (work as a sound transducer) converts sound heart beat of human body into electrical signal which is very low frequency signal. So we need amplifier for this process. This signal applied to the opt coupler used as a comparator. When signal, received from amplifier, is 0v; then opt coupler output is 0V.When the signal received from amplifier circuit is more than 0V up to the +5V, comparator output is high. Output of comparator also needs to connect in the form of digital signal that's why the signal is applied to ADC through multiplexer. Again the PIC microcontroller executes the data transmission program and transmits this data via USART to GSM module display.

A Universal Asynchronous Receiver/Transmitter, abbreviated UART is a piece of computer hardware that translates data between parallel and serial forms. UARTs are commonly used in conjunction with communication standards such as EIA, RS-232, RS-422 or RS-485. The universal designation indicates that the data format and transmission speeds are configurable. The electric signaling levels and methods are handled by a driver circuit external to the UART.

The Universal Asynchronous Receiver/Transmitter (UART) takes bytes of data and transmits the individual bits in a sequential fashion. At the destination, a second UART re-assembles the bits into complete bytes. Each UART contains a shift register, which is the fundamental method of conversion between serial and parallel forms. Serial transmission of digital information (bits) through a single wire or other medium is less costly than parallel transmission through multiple wires.In UART is transmitting and received data simultaneously by using transmitting and received pin of microcontroller. In a transmitting pin of transfer data and receiving pin of received data. Time to handle an interrupt from the UART and prevents loss of received data at high rates.[5]

D. *GPS AND GSM SECTION:*

The GPS module is used to detect the position of human body (soldier). It displays the location of longitude and latitude on LCD display. In this way, the human body is detected at any position using this module.On first section we can detect the temperature of human body and display it on

LCD screen and in third section we can detect the position of human body using GPS satellite communication.

The following figure shows the interfacing of GSM module with PC computer port.

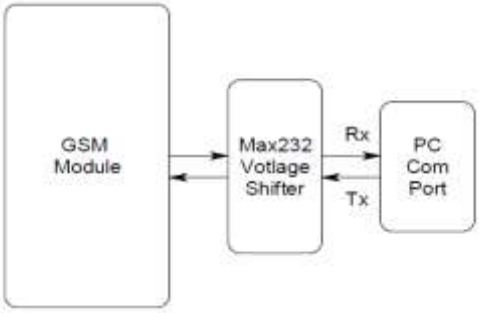

Fig.6. Interfacing GSM modem to PC computer port

GSM modem is interfaced with PC computer port through expansion slot of the motherboard of computer peripheral.GSM module work on a +5v and computer system work on +12v power supply. That's why it needs to isolate the voltage of for MAX232 to shift the voltage +5v for GSM module and +12v for computer system. For proper transmission and reception of serial communicated data in between computer and GSM modules.

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Using the Global Positioning System (GPS, a process used to establish a position at any point on the globe)

The Following two values can be determined anywhere on Earth.

1. One's exact location (longitude, latitude and height co-ordinates) accurate to within a range of 20m to approx. 1mm.
2. The precise time (Universal Time Coordinated, UTC) accurate to within a range of 60ns to approx.5ns. Speed and direction of travel (course) can be derived from the co-ordinates as well as the time. The coordinates and time values are determined by 28 satellites orbiting the earth.

GPS receivers are used for positioning, locating, navigating, surveying and determining the time and are Employed both by private individuals (e.g. for leisure activities, such as trekking, balloon flight sand cross country Skiing etc.) And companies (surveying, determining the time, navigation, vehicle monitoring etc.). GPS (the full descriptions: Navigation System with Timing and Ranging Global Positioning System, NAVSTARGPS) was developed by the U.S. Department of Defences (DOD) and can be used both by civilians and military personnel. The civil signal SPS (Standard Positioning Service) can be used freely by the general public, whilst the Military signal PPS (Precise Positioning Service) can only by authorized government agencies. The first Satellite was placed in orbit on 22nd February 1978, and there are currently 28 operational satellites orbiting the Earth at height of 20,180kmon 6 different orbital planes. Their orbits are inclinedat55° to the equator, ensuring that list 4 satellites are in radio communication with any point on the planet. Each satellite orbit The Earth in approximately 12 hours and has four atomic clocks on board. During the development of the GPS system, particular Emphasis was placed on the following three aspects: [8]

1. It had to provide users with the capability of determining position, speed and time, whether in motion Orates.
2. It had to have a continuous, global, 3-dimensional positioning capability with a high degree of accuracy, irrespective of the weather.
3. It had to offer potential for civilian use.

XXVII. APPLICATIONS

The proposed alive human detector can be used in various fields. Some of the advantages are discussed below:

A. Military Services :

Alive human detector is a system useful for military services for detection of human body and check the exact position of body using GPS.

B. In Chemical factory :

In chemical factory, when this module which will connect to body then after any difficulty we will detect how many body alive or not.

XXVIII. ADVANTAGES

A. It is small unmanned fully autonomous & a light weight system and therefore it can be fielded in narrow passage very easily as it is futilely autonomous no controlling is required.
B. Due to its light weight power requirements are less and easy to carry. Its microcontroller based circuitry makes it simple and compact and provides more flexibility as in future if any change is required then only by changing the program its functionality can be changed.
C. All through low cost standard processing hardware was chosen. It performs well and is capable of doing work efficiently.
D. It has caterpillar type wheel arrangement it help in the movement of the vehicle in rough terrain. Also its turning radius is very small.

XXIX. CONCLUSION AND FUTURE SCOPE

In this way the contribution of this work is to provide a sensor suitable for human detection in the urban disaster environment. One of the most challenging parts of this project is to find a lightweight and low cost solution. Hence we will detect the alive human body.

Hence many life's can be saved by using this autonomous module during an earthquake disaster in a short duration which becomes time consuming and unaffected if done manually. This module can be improved by using high range sensors and high capacity motors. Some more sensors like mobile phone detector, metal detector etc. can be implemented to make this vehicle more effective.

ACKNOWLEDGMENT

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Survey on different Biomaterial and Biomechanical stents that the during airway Obstruction

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Abstract

Airway and coronary arteries can be obstructedby a variety of diseases. Airway are mainly obstructedby lung cancer, scar inflammation or weakening of the airway wall .the main cause of cholesterol in the human body. The aim of the presented work was determination of the biomechanical characteristics of the vascular stent maid of stainless steel (cr-ni-mo) and co- cr- w-ni alloy. In order to determine the strength characteristics of the analyzed stent the finite element method was applied. Geometrical model of the vascular stent, which was meshed with the use of the SOLID95 element was worked out. Although their success has been outstanding, the patients that have received stents are vulnerable to thrombosis and rest enosis. Appropriate solution were suggestion provided to overcome the difficulties of the patient.

Keyword: stents, chromium-cobalt, stainless, steel, radioactive stents, friction in stents

I. INTRODUCTION

Stents are generally used instead of – or along with –angioplasty. In recent years a dynamic development in diagnostics of vascular diseases, as well as in operational procedures, was observed. Even though, this should be clearly mentioned that operational procedures on arteries are palliative procedure operations only. It is collapsed into a small diameter and put over a balloon catheter. It is moved into the area of the blockage. The coronary stents are mainly made of metallic biomaterials (stainless steel, Co-Cr-W-Ni and Ni-Ti alloys). The four main biomaterials that are used to make stents are Stainless SteelCobalt Chromium, Tantalum and Nitinol. The purpose of this article is to study these different materials. Implantation of stent is a minimally invasive procedure. During the angioplasty procedure, a thin tube called a catheter is placed through the groin or arm and passed through an artery to the site of the blockage.

II. RADIOACTIVE STENTS

Radioactive stents have been shown to inhibit recurrentblockage of arteries (rest enosis) following angioplasty.This article investigates alternative methods to produce calibration technique for the stents related to nationalstandards. In order to provide accurate clinical dosimeter, calibration of these sources is required. Air kerma strength this calculated after charge is collected in an ionization chamber at consecutive distances from a stationary source, known as the "seven distance technique". This technique has been extended to a Low Dose Rate (LDR) 192Ir source in preparation to measure the 198Au stents. The emitted gamma ray energies are similar for these two isotopes,(198Au E(gamma) = 405 keV and 192Ir E(gamma) = 397keV) so this should be an effective calibration tool for198Au radioactive stents.

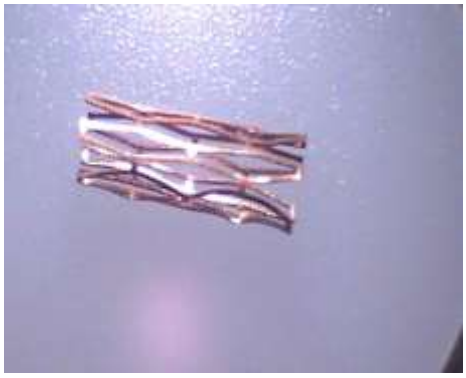

Fig. 1 Radioactive Stents

III. FRICTION IN STENTS

Friction is a component in stents that can be an advantage and a disadvantage. First because friction can be good so that it doesn’t slide

from its specific place in the artery. Friction can also be a disadvantage because it is very difficult to deploy it in the artery. The deployment of a stent it is difficult to advance a balloon catheter as more friction between the wire and the vessel wall exists in a small vessel, very low profile balloons are frequently used Deployment of stents in small vessels may be more challenging. Friction is higher and stent advancement is more difficult. The lesions may be localized in more distal segments of after tortuous segments.

In vitro experiments have shown that stents without side holes, those made with material with a low coefficient of friction or containing a hydrophilic coating, resist bacterial colonization at sites of surface irregularity and sludge formation because they are not as smooth as one would like. Coated stents have low coefficient of friction that may increase stent longevity. The coating provides maximum Friction reduction, which aids the passage of the catheter through lesions in blood vessels To reduce friction coatings are used. Hydrophilic polymer coating further stenos - leading to the formation of free jets – are involved. This paper presents a progress report on ongoing efforts to develop a viable method for the treatment of transition in arterial flows within the framework of two equation models of turbulence.

IV. MECHANICAL PROPERTIES

Through the years the materials that are used to make stents have been changing. These advances in the discovery of new materials for the production of stents are moving very quickly. In almost every biomechanical product the use of stainless steel is the main choice other materials excluding stainless steel are the Nickel – Titanium (Nitinol), Silicon, Cobalt chromium. According to different sources and different companies and what products they offer stainless steel is most use. In a second perspective we find the nitinol. This material is very popular in the market because of his capability of self –

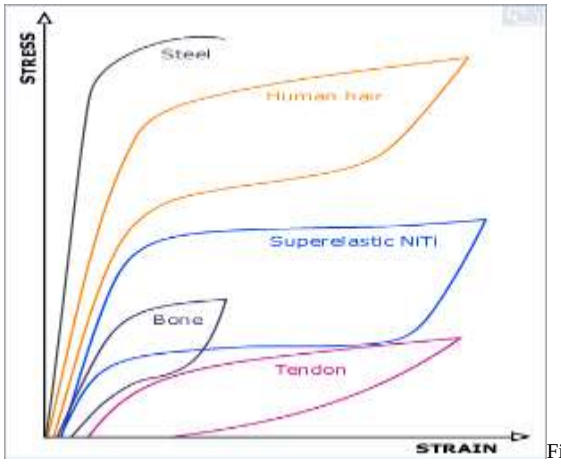

Fig.2 Response of Metals Stress vs Strain

Expanding. This process is interesting because the process of the angioplasty is not necessary. Other materials are not as frequently use in the marketplace because of their recent introduction to the public. Some are like the silicone and cobalt chromium. As a way to look always for the new things and finding out what is new and effective we compare what is new in the market and what is already well established.When doing an analysis of the value in a stress – strain diagram we found that if the modulus is higher means that the slope of the curve in the linear elasticity part is steepest. Meaning that is need a bigger stress to develop a considerable strain.

A) Cobalt chromium

For the chromium cobalt there is a lot of ambiguity in the field of the construction of stents because of their early introduction to the world. This material is also used for other biomechanical devices like hip replacement. The modulus of elasticity is defined by Hooke's law. is 235Gpa.For cr-co.

B) Stainless steel

May corrode inside the body under certain circumstances such as highly stressed and oxygen depletion region that's why suitable for fracture plates screws etc. modules of elasticity is 193gpa.

V. RESULT

One cannot put any type of material in the human body. Biocompatibility must be evaluated first for any kind of material. Each of the material has its up sides and down sides. The majority of stents that we see in the market are of stainless steel however, there are several materials that have been used in human body. But co-cr has been found more elastic than stainless steel.

VI. CONCLUSIONS

Selections of mechanical properties of metallic biomaterial as well as physio-chemical properties of stent are important issues when forming of application features is involved. The forming is based on selection of proper biomechanical characteristics determined with an implantation procedure taken into account. This results from an expansion of a stent Conclusions.co-cr as suitable the co-castanets have similar safety in relation to stainless steel but co-cr is more elastic in comparison to stainless steel hence for proper arterial blood flow and accurate calibration of stents co-cr is better.

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" System for Shot Boundary Detection Using Block Histogram Difference Method"

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Abstract— **Retrieval of video from large digital video storage is challenging task. Video segmentation is first step in the process of efficient video indexing retrieval. Video shot boundaries needs to be clearly detected which will help in key frame extraction and then video retrieval .The shot transition are of two types i.e. Abrupt Transition & Gradual Transition .In Gradual Transition , there are three types – fade in /fade out, dissolve and wipe. In our topic we developed multi-stage algorithm for shot boundary detection.**

Keywords— **Shot boundary detection, Histogram detection**

I.INTRODUCTION

The demand for intelligent processing and analysis of multimedia information has been rapidly growing in recent years. Researchers have actively developed different approaches for intelligent video management, including shot transition detection, key frame extraction, video retrieval, etc. Among these approaches, shot transition detection is the first step of content-based video analysis and key frame is a simple yet efficient form of video abstract. It can help users to understand the content at a glance and is of practical value.

Video can be represented by a hierarchical structure consisting of five levels (video, scenes, group, key frame and shot) from top to bottom increasing in granularity, while a shot is the basic unit of video. A shot is defined as a sequence of frames captured by the camera in a continuous manner and without interruptions. An interruption between the shot is called as the transition. An abrupt transition between shots corresponds to a sudden change(cut) between two consecutive frames, while a gradual transition prolongs itself throughout a small (comparing to entire video sequence) number of frames. The later can be further classified as dissolve, fade, wipe or other complex types. A fade is slow change in brightness of images usually resulting in (fade out) or starting with (fade in) a solid black frame. In a dissolve, the scene from the previous shot slowly fades out,while the image from next shot slowly fades in simultaneously.

Shot boundary detection (SBD) is an essential step towards semantic video retrieval and indexing, it aims to segment the video into some consecutive partitions temporally. The idea of SBD is simply finding the discontinuity of visual contends. It is difficult to build general model to detect the type and location of these transition. Usually , a SBD system extracts one or more low level features, then run pair-wise comparison between the current frame and successive frame and decide whether the boundary occurs or not. Now,people proposed a general model construction method and emerged various methods for model construction.

Many approaches used different kinds of features to detect shot boundary, including histogram, shape information, motion activity. Among these approaches, histogram is the popular approach. However, in these histogram-based approaches, pixels, space distribution was neglected.

Different frames may have the same histogram. In view of this, we divided each frame into 'r'blocks, and the difference of the corresponding blocks of consecutive frames was computed by color histogram, thedifference D(i,i +1) of the two frames was obtained by adding up all the blocksdifference in the meanwhile, the difference V(i,i +1) between two frames i and i +1 was measured again without using blocks. Based on D(i,i +1) and V(i,i +1), shot boundary was determined. Getting over the drawback of the paper, we propose more efficient algorithms for shot boundary detection and key frame extraction with automatic threshold.

II.BASICS OF VIDEO

The video carries multimodal information like speech, audio ,text and picture information. The pictorial information in video is considered to be the series of images what are called frames. These frames are run at a specific speed (say 30 frames per second) to make them it video. As per theproduction standards a video sequence is composed typically of a set of many video shots. To facilitate the processing of video objects, a video sequence is first segmented into video shots. A shot is a (finite) sequence of frames recorded contiguously from the same camera (usually without viewpoint change).

Video processing typically involves processing of live or recorded video from one or more cameras to enhance images or extract multimodal information for characterization, selection, retrieval and recognition

III.TYPES OF VIDEO

There are several types of the video exit. The video types are depends on the codec that are used to compressed the videos. Some of the video formats are mentioned below

- MPEG
- AVI
- VLC
- OGG
- FLY
- TIFF
- XCF
- PSD

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IV. IMAGE

Image is the array of the pixels. The image may be black and white, gray scale, RGB image or RGBa. Technically speaking the following terms are used.

A digital video consists of frames that are presented to the viewer's eye in rapid succession to create the impression of movement. "Digital" in this context means both that a single frame consists ofpixels and the data is present asbinary data, such that it can be processed with a computer. Each frame within a digital video can be uniquely identified by its frame index, a serial number.

The image or the frame in a video is as shows in fig below

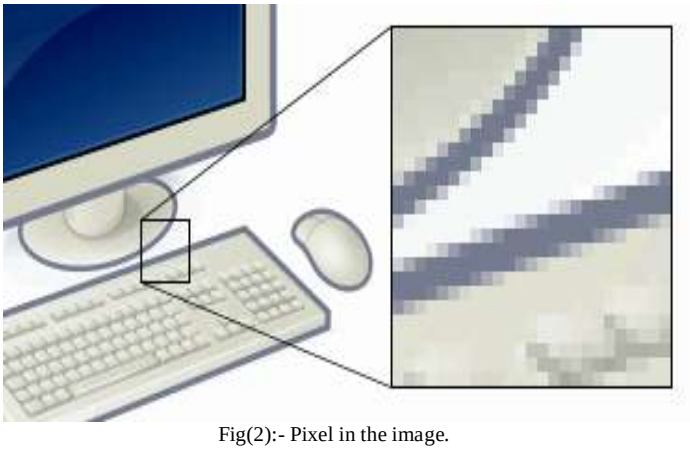
5.Fig(1):- Image (frame)

So from now whenever we talk about the frame, it is nothing but the image.

VI. PIXEL

Pixel is the smallest part of the frame.In digital imaging, a pixel, or pix (for picture) and (for element) is a physical point in a raster image, or the smallest addressable element in a display device; so it is the smallest controllable element of a picture represented on the screen. The address of a pixel corresponds to its physical coordinates. LCD pixels are manufactured in a two-dimensional grid, and are often represented using dots or squares, but CRT pixels correspond to their timing mechanisms and sweep rates.

Each pixel is a sample of an original image; more samples typically provide more accurate representations of the original. The intensity of each pixel is variable. In color image systems, a color is typically represented by three or four component intensities such as red, green, and blue, or cyan, magenta, yellow, and black.Fig (2) shows the portion of image in the pixels.



Fig(2):- Pixel in the image.

One wrong concept about the pixel is that pixels are square form. But this is wrong concept, it depends. Pixel might be in the form of square, dot, lines or rectangular form also.] Types of Transition:-

VI.THERE ARE TWO TYPES OF TRANSITION

1. Gradual transition
2. Abrupt transition

1.Gradual transition

Gradual transition is the slow change from one frame to another frame. In this kind of transitions the two shots are combined using chromatic, spatial or spatial-chromatic effects which gradually replace one shot by another. These are also often known as soft transitions and can be of various types, e.g., wipes, dissolves, fades.

a] Fade in / Fade out:-

The termsfade-out and fade-in are used to describe a transition to and from a blank image. In the fade in effect, the totally dark image change into the bright one while in case of the fade out , the bright one convert into dark gradually.

b] Dissolve:-

Like the fade, a dissolve involves gradually changing the visibility of the picture. However, rather than transitioning from a shot to a color, a dissolve is when a shot changes into another shot gradually. Dissolves, like cuts, can be used to create a link between two different objects, a man telling a story, and a visual of his story, for instance

c] Wipe:-

A wipe involves one shot replacing another, travelling from one side of the frame to another. Think of a vertical line passing from the right side of the frame to the left. On the left side of this line, we have shot A, and on the right side of this line is shot B. When this line reaches the left edge of the frame, shot B will completely fill the scene, and the transition

is complete. This example describes a vertical line wipe, though this is but one type of wipe.

Another common type of wipe uses objects in the scene, rather than an invisible vertical line. One interesting application of this creates the illusion of a camera passing through the ceiling of the bottom floor of a multi-story house to the ground of the floor above. In this case, shot A would consist of the camera rising to the ceiling, and shot B would have the camera rising from the ground. A wipe transition give the impression the camera is passing between the floors of a house.

The wipe has several types like horizontal, diagonal, star, heart shape, zig-zag, vertical, clockwise, anti-clockwise, door etc.

(a) A shot cut

(b) A fade in

(c) A fade out

(d) A dissolve

(e) A wipe

2.Abrupt Transition:-

The abrupt transitions only involve the cut effect. This is the sudden change in the image, where one frame converting to another suddenly.

VII. IDEA OF SHOT DETECTION

IMAGE SEGMENTATION**:-**

Each frame is divided into blocks with m rows and n columns. Then the difference of the corresponding blocks between two consecutive frames is computed. Finally, the final difference of two frames is obtained by adding up all the differences through different weights.

VIII. ATTENTION MODEL

Aswe know the crimes are increasing day by day. So we need to increase the security. Several security companies are emerging to give the protection. Surveillance cameras are implemented here and there for increasing the security. So what we do the different, we are taking the advantage of the Surveillance cameras and giving input to our algorithm it will give the key frames that is those frames where there the change in the picture occurs. So if we are retrieving the shooting of the cameras it will help us to detect where the change occurred.

IX.MATCHING DIFFERENCE

There are six kinds of histogram match. Color histogram was used in computing the matching difference in most literatures. However, through comparing several kinds of histogram matching methods, we reached a conclusion thathistogram outperformed others in shot recognition. Hence, histogram matching method is proposed in this paper with the adaptive threshold.

X.PREVIOUS APPROCHES TO SHOT DETECTION

Thereare several approaches to detect the shot and lots of research had done in this topic. Some of them are as below.

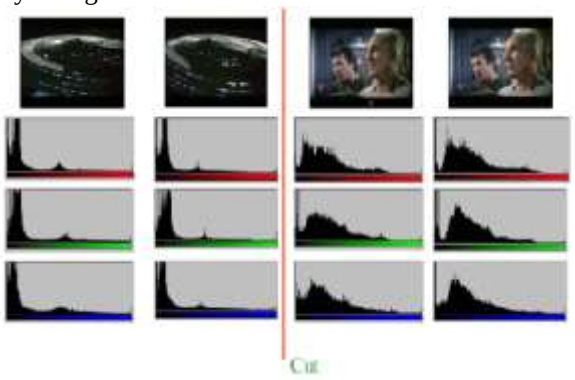
1. General Approaches:-
   - Pixel Comparison
   - Block Difference
   - Histogram Comparison
   - Edge Change Ratio
2. Recent Work:-
   - Histogram Block Difference
   - Average frame similarity

Pixel Comparison:-

This method is also called as the Sum of Absolute Difference (SAD) method. This is both the most obvious and most simple algorithm of all: The two consecutive frames are comparedpixelby pixel, summing up theabsolute values of the differences of each two corresponding pixels. The result is a positive number that is used as the score. SAD reacts very sensitively to even minor changes within a scene: fast movements of the camera, explosions or the simple switching on of a light in a previously dark scene result in false hits. On the other hand, SAD hardly reacts to soft cuts at all. Yet, SAD is used often to produce a basic set of "possible hits" as it detects all visible hard cuts with utmost probability.

Histogram Comparison:-

In this method histogram difference of two consecutive frames are calculated. Basically transition is abrupt i.e. cut; frames are suddenly changes from one to another.



Histogram difference of two consecutive frames.

XI. PROPOSED ALGORITHM

Here, we are using histogram with adaptive threshold for shot detection and key frames extraction. The algorithm differs from conventional methods mainly in the use of image segmentation and attention model. Matching difference between two consecutive frames is computed with different weights. Shot are detected with automatic threshold. Key frames are extracted by using reference frame-based approach. The following flow chart represents the proposed algorithm.

STAGES IN PROPOSED ALGORITHM**:-**

StageI)VideoSegmentation

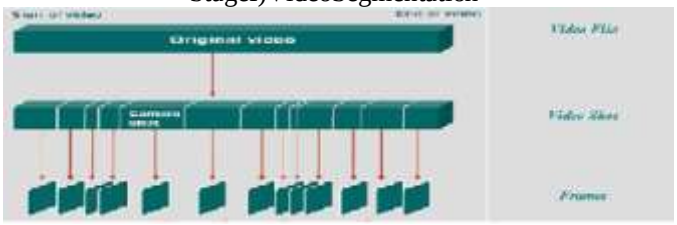


Fig (3):- Video segmentation.

Fig (4) shows the video segmentation, in this original video file is con1verted into video shot and then into different frames.

Stage II) RGB to Gray

The frames may have colour in RGB. In this step we are converting colour frames from RGB to gray scale. As RGB contain 24 bit representation so the possible combination of RGB colour is up to1.6 million whereas, gray scale contains 8 bit representation so the possible combinations are up to 256.

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Stage IV) Histogram Difference

Now, we are taking the histogram of each block

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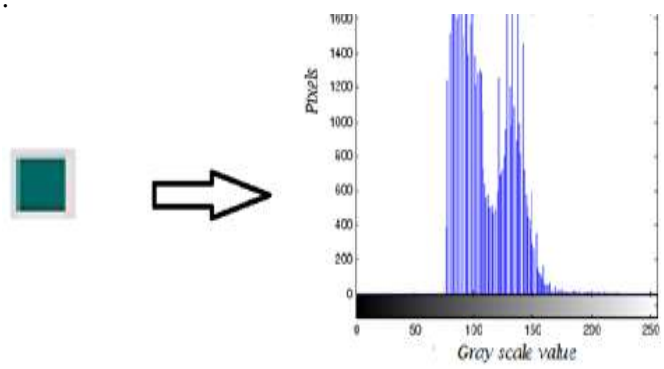


Fig (5):- Histogram of the block.

The figure shows the gray cale intensities on the x-axis while on the Y –axis number of pixels are taken. In short the graph shows, for what intensity how much pixels are there in that image.The different image shows the different histogram as below

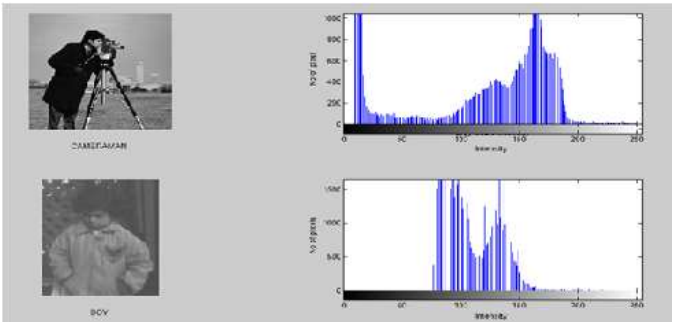


Fig (6):- Histogram of different images

Stage V) Block Differenc

So it is easy to computing different parameter in gray scale rather than RGB.

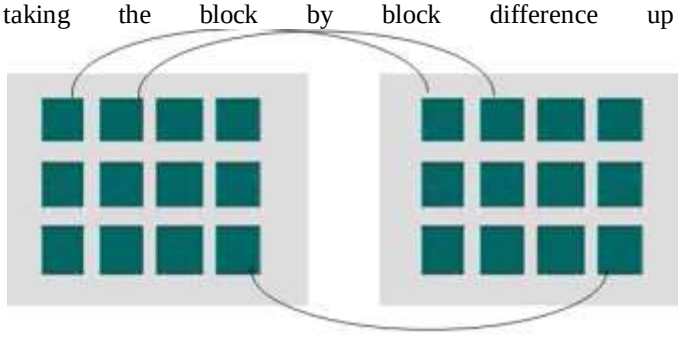
Stage III)Divide Frames into Blocks

In this stagewe are converting the each frame into blocks of size M×N

Fig (4):- frame divided into size of M×N.

The figure shows the image is divided into the different blocks of size M×N. Here the frame is divided into 4columns and 3 rows. We are dividing the image into blocks to overcome disadvantages of the general approachesThe frames may have colour in RGB. In this step we are converting colour frames from RGB to gray scale. As RGB contain 24 bit representation so the possible combination of RGB colour is up to1.6 million whereas, gray scale contains 8 bit representation so the possible combinations are up to 256.

Now, we are considering the two consecutive frame and taking the block by block difference up



Frame k Frame k+1

Computing histogram matching difference between the corresponding blocks between consecutive frames in video sequence. H (i, j, k) and H (i, j, k +1) stand for the histogram of blocks at (i, j) in the k^{th} and $(k+1)^{th}$ frame respectively. Here we are taking square of the difference because we do not want the negative value.

Now from the block difference of the consecutive frames, the block difference of whole frame is given by

$$D_B(k,k+1,i,j)=\sum_{l=0}^{L-1}\frac{[H(i,j,k)-H(i,j,k+1)]^2}{H(i,j,k)} \quad \text{……..} \quad (1)$$

Where, $H_{(i,j,k)}$ is histogram of frame k

$H_{(i,j,k+1)}$ is histogram of frame k+1

L is total no of blocks

Stage VI) Histogram block difference

Computing histogram difference between two consecutive frames

$$D(k,k+1)=\sum_{i=1}^{m}\sum_{j=1}^{n}w_{ij}D_B(k,K+1,i,j) \quad \text{……...….} \quad (2)$$

Where, w_{ij} stands for the weight of block at (i, j)

Stage VII)Mean Deviation

The next stage is to compute the mean deviation. The mean deviation is calculated as follows,

$$MD = \frac{\sum_{k=1}^{Fv-1} D(k,k+1)}{Fv-1} \quad \text{…….} \quad (3)$$

Where, Fv denote total number of frame.

Stage VIII) Standard Deviation

In this stage the standard deviation is calculated for the two consecutive images. That standard deviation is calculated by s

$$STD = \sqrt{\frac{\sum_{k=1}^{Fv-1}(D(k,k+1)-MD)^2}{Fv-1}} \quad \text{……..} \quad (4)$$

Let F (k) be the k^{th} frame in video sequence, k = 1,2,…., Fv（Fv denotes the total number of video.

Stage IX) Adaptive Threshold

In this stage, we are calculating the adaptive threshold for the two consecutive frames which are under observation. The threshold is given by following formula.

$$\boldsymbol{Threshold = M.D + (Thresold\ factor * STD)} \quad \text{……} \quad (5)$$

The mentioned threshold is adaptive as the mean deviation and the standard deviation are changing for every consecutive frame. The threshold factor is initialized as 1. If we have initialized the threshold factor less than 1 then we get less threshold value and wise versa we will have larger threshold value if we have initialized the threshold factor greater than 1.

XII. EXPERIMENTAL RESULT

Now to show the algorithm is effective, we have calculated the abrupt transition i.e cut detection , precision and recall. The formulae for calculating recall and precision are as below.

$$\text{Recall} = \frac{correct}{correct\ + missed}$$

$$\text{Precision} = \frac{correct}{correct\ + false}$$

VIDEO	RECALL	PRECISION
Video 1	70.60%	82.70%
Video 2	74.90%	83.10%
Video 3	62.50%	75.01%
Video 4	69.00%	81.53%
Video 5	72.60%	88.36%
Video 6	82.93%	91.42%
Video 7	65.81%	85.00%
Average	**71.19%**	**83.87%**

Table :- Experimental results.

XIII. CONCLUSION & FUTURE SCOPE

An effective shot change detection system using multi-stage algorithm is presented. After detecting a shot we can extract the KEY frame from the video.Histogram method is very time consuming process but the accuracy is higher especially in Gradual transitions.It shows a very good performance at detecting the cuts, fades, and dissolve and for wipe;it has relatively good result too.This method is well supported to the uncompressed stream. In future this method can extend to all types of videos and also extend for any format of the video.

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Pill Camera

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Abstract—**The aim of technology is to make products in a large scale for cheaper price and increased quality. The current technologies have attained a part of it,but the manufacturing technology is at macrolevel. The future lies in manufacturing product right from the molecular level.Research in this direction started way back in eighties. At that time manufacturing at molecular and atomic level was laughedabout. But due to advent of nanotechnology we have realized it to acertain level. One such productmanufactured is PILL CAMERA, which is used for the treatment of cancer, ulcer andanemia. It has made revolution in the fieldof medicine. This tiny capsule can passthrough our body, without causing anyharm. We have made great progress inmanufacturing products. Looking back from where we stand now, we started fromflint knives and stone tools and reached thestage where we make such tools with more precision than ever. The leap in technologyis great but it is not going to stophere.**

Keywords— **Pill Camera, Cancer Camera.**

I. INTRODUCTION

With our present technology wemanufacture products by casting, milling, grinding, chipping and the likes. Withthese technologies we have made morethings at a lower cost and greater precisionthan ever before. In the manufacture of these products we have been arrangingatoms in great thundering statistical herds.All of us know manufactured products aremade from atoms. The properties of those products depend on how those atoms arearranged. If we rearrange atoms in dirt, water and air we get grass. The next stepin manufacturing technology is tomanufacture products at molecular level.The technology used to achievemanufacturing at molecular levelis³nanotechnology´. Nanotechnology is the creation of useful materials, devices and system throughmanipulation of such minuscule matter .Nanotechnology deals withobjects measured in nanometres. Nanometre can be visualized as billionthof a meter or millionth of a millimetre or itis 1/80000 width of human hair.

A. Pill Camera May Make Cancer Diagnose

The new camera-pill may make endoscopies thing of the past recent news coverage has heralded the arrival of a new "camera you can swallow" that "could help detect early stages of cancer of the oesophagus".

The high-tech device, about the size of a large vitamin pill, uses optical lasers to photograph the insides of the stomach and oesophagus in detail.

Diagnosis of esophagus cancer

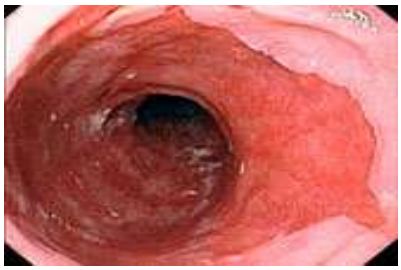

Fig.1oesophagul cancer

It is hoped that this new investigative technique may help spot early signs of cancers of the digestive system, such as oesophagealcancer (also known as cancer of the gullet). The researchers suggest the cancer camera is a quick, simple and pain free imaging method that patients may prefer to endoscopy – the current method of investigating the lining of the digestive system – where a thin tube with a camera and a light source at the end is passed down into the oesophagus.

Endoscopies have a number of practical disadvantages, including:

- They are often performed under sedation, so they can be time-consuming
- They require specially-trained staff, so they can be expensive to carry out (specialist staff usually want specialist pay rates). Because of these disadvantages, diagnosing oesophageal cancers can place a strain on resources.However, if this new technology is proved to be quick, safe andeffective (and that is a very big 'if') then the diagnosis process may become a lot easier.
- Another advantage is that the camera can provide more detailed images than current investigative methods such as endoscopy.

II. CANCER CAMERA

The cancer camera is a new way of investigating the lining of the gastrointestinal tract for signs of diseases such as cancer, or abnormal cells that are likely to go on to become cancerous.

The cancer camera, or "opto -mechanically engineered pill", is a small (12.8mm by 24.8mm) high-tech pill-shaped laser camera that is attached to a thin string-like wire, called a tether. The pill, which is swallowed, captures microscopic images of the lining of the oesophagus and gut at high resolution as it travels naturally through the digestive tract.

The wire also allows an operator to control the position of the pill in the digestive tract to look at specific areas of interest.

III. WORKING

It is slightly larger than normal capsule. The patient swallows the capsule and the natural muscular waves of the digestive tract propel it forward through stomach, into small intestine, through the large intestine, and then out in the stool. It takes snaps as it glides through digestive tract twice a second. The capsule transmits the images to a data recorder, which is worn on a belt around the patient's waist while going about his or her day as usual .The physician then transfers the store data to a computer for processing and analysis. The complete traversal takes around eight hours and after it has completed taking pictures is comes out of body as excreta. Study results showed

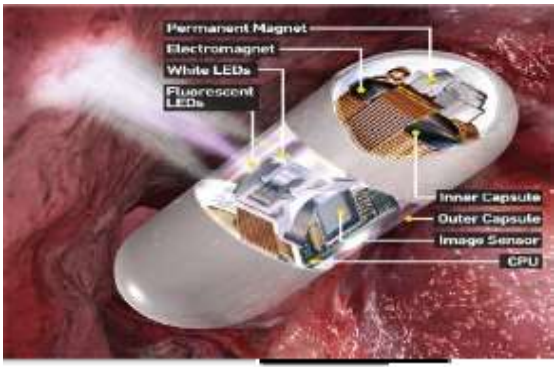

Fig.2 Camera pill

That the camera pill was safe, without any side effects, and was able to detect abnormalities in the small intestine, including parts that cannot be reached by the endoscope .The tiniest endoscope yet takes 32-megapixel images per second and offloads them wirelessly. See how it works inside the body in an animation. Pop this pill, and eight hours later, doctors can examine a high-resolution video of your intestines for tumours and other problems .This capsule was developed by the Japanese RF System Lab. The patient gulps down the capsule, and the digestive process begins .Over the next eight hours, the pill travels passively down the oesophagus and thoroughly 20 to 25 feet of intestines, where it will capture up to 870,000 images. The patient feels nothing .Batteries would be too bulky,so the cam draws its power through induction charging. A vest worn by the patient contains a coil that continuously transmits power .Start Snapping When it reaches the intestines, the Sayaka camera begins capturing 30 two-megapixel images per second (twice the resolution of other pill cams). Fluorescent and white LED's in the pill illuminate the tissue walls. Sayaka is the first that gets a clearer picture by mounting the camera facing the side and spinning 360 degrees so that it shoots directly at the tissue walls. As the outer capsule travels through the gut, an electromagnet inside its polarity.

A. Components Used in Pill Camera

- Optical dome
- Lens holder
- Lens
- Illuminating LED'S
- CMOS image sensor
- Battery
- ASIC transmitter
- Antennae

B. Pill camera platform components

- Sensor array belt
- Data recorder
- Real time viewer
- Workstation and rapid software

IV. USES

- Crohn's disease
- Malabsorption Disorders
- Tumors of the small intestine and vascular Disorder
- Ulcerative Colitis
- Disorders related to small bowel injury

V. ADVANTAGES

- A pill camera can be easily swallowed.
- It provides doctors more detailed images and the entire digestive track not visible by other techniques and records 870,000 images.
- Harmless to the patient of and easier than a endoscopy and it include the avoidance of standard endoscopy. .
- The patient can continue their everyday life once he /she has successfully swallowed the pill cam and no sedation is necessary for capsule endoscopy.
- Doctors can steer the images of the internal body as they wish.
- The pill cam platform is an efficient, patient – friendly and clinically proven diagnostic solution that provides accurate visualization of the gastrointestinal tract in its natural state.

VI. CONCLUSIONS

Wireless capsule endoscopy represents a significant technical breakthrough for the investigation of the small bowel.

The endoscopy system is the first of its kind to be able to provide noninvasive imaging of the entire small intestine.
It is cheap because it so small it doesn't require anesthesia and sedation, which increase cost of the traditional proce.

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Serum based diagnosis of asthma using Raman Spectroscopy

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***Abstract*- The currently prescribed tests for asthma diagnosis require compulsory patient compliance, and are usually not sensitive to mild asthma. Development of an objective test using minimally invasive samples for diagnosing and monitoring of the response of asthma may help better management of the disease. Raman spectroscopy (RS) has previously shown potential in several biomedical applications, including pharmacology and forensics. In this study, we have explored the feasibility of detecting asthma and determining treatment response in asthma patients, through RS of serum. Serum samples from 44 asthma subjects of different grades (mild, moderate, treated severe and untreated severe) and from 15 reference subjects were subjected to Raman spectroscopy. Differences like changes in protein structure, increase in DNA specific bands and increased glycosaminoglycans-like features were more prominent with increase in asthma severity. Multivariate tools using Principal-component-analysis (PCA) and Principal-component based-linear-discriminant analysis (PC-LDA) followed by Leave-one-out-cross-validation (LOOCV), were employed for data analyses.**

***Keywords*-phenotypes, Glycosaminoglycans,leukotrienes,sarcoidosis,Galactosamine, glucoronic acid and glucosamine.**

I. INTRODUCTION

Asthma is a chronic inflammatory disorder of the airways characterized by airway hyper-responsiveness (AHR) and reversible airflow obstruction that fluctuates over time . Airway obstruction and allergic inflammation during the disease occur due to release of IgE and pro-inflammatory cytokines such as T helper cell type 2 (Th2) and other immune effector cells producing toxic inflammatory molecules that ultimately elicit obstruction. Based on clinical parameters, patients are assigned to distinct categories (mild, moderate, severe or very severe) that allow optimal medical decisions on treatment and prognosis to be made for individual phenotypes.Current diagnosis of asthma is based on a history of wheeze, shortness of breath, and cough, which are variable in severity and over time. However, these are primarily based on demonstrating abnormal airway physiology, which may not always be present in mild asthma, leading to a decreased sensitivity.

Raman spectroscopy (RS), a vibrational spectroscopic method based on inelastic scattering of light. In light of need for better diagnostic tools with attributes like rapidity, objectivity and the use of minimally invasive samples, RS could serve useful for detection of asthma. Thus, this was carried out to explore the potential applicability of RS in detecting disease-related perturbations in serum of mild, moderate and severe asthma as well as reference subjects.

II. MATERIALS AND METHODS

A. Subject recruitment

1) Subject screening-A sample size of 44 subjects was included in the active arm of the study. The asthmatic conditions were further classified into 4 different categories viz., mild (n=12), moderate (n=12), untreated severe (n=10) and treated severe (n=10) cases.

2) Serum separation.-A quantity of 5 ml blood was collected from each subject in a micro-centrifuge tube with the help of a sterile injection after informed and written consent. Samples were placed standing for 30 minutes to allow clot formation and then centrifuged at 3500 rpm for 10 minutes. After removing the fat body with the help of a microtip, samples were centrifuged again at 3500 rpm for 10 minutes. After 24 hours, samples were allowed to thaw passively, following which Raman spectra were acquired.

B. Raman spectroscopy

1) Spectral acquisition.-After passive thawing, samples were subjected to Raman spectroscopy by placing 30 µl serum sample on calcium fluoride (CaF2) window and recording spectra using Fiber Optic Raman microprobe. This Raman system

consists of laser as an excitation source and HE 785 spectrograph coupled with CCD as dispersion ,correction and detection elements respectively. Optical filtering of unwanted noise, including Rayleigh signals, is accomplished through 'Superhead', the other component of the system. Optical fibers were employed to carry the incident light from the excitation source to the sample and also to collect the Raman scattered light from the sample to the detection system. Spectra were integrated for 10 seconds and averaged over 6 accumulations.Spectra were interpolated in 800-1800 cm-1 region.

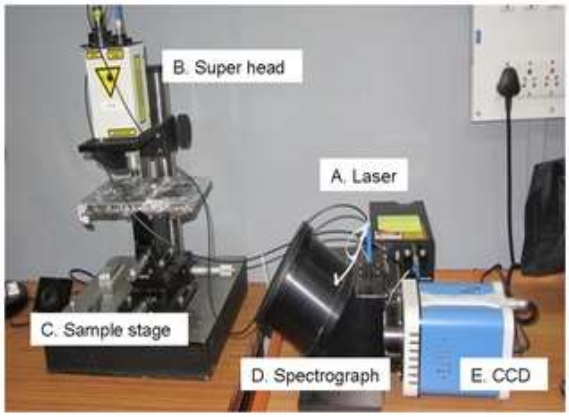

Figure 1.experimental setup for Raman Spectroscopy

2) Multivariate analysis-Vector normalized first derivatives of spectra were subjected to multivariate unsupervised principal component analysis (PCA) and supervised Principal Component-Linear Discriminant Analysis (PC-LDA). PCA is a routinely used method for data compression and visualization. LDA provides data classification based on an optimized criterion which is aimed for better class separability. LDA models were validated by Leave-one-out cross-validation (LOOCV). LOOCV is a type of rotation estimation used mainly for smaller datasets.

III. RESULT

This study was undertaken to explore the possibility of RS based diagnosis of asthma using a minimally invasive sample like serum. Such an approach could serve as an objective method for asthma diagnosis for all patients (irrespective of age) and could also enable "distance diagnosis" where the samples could be transported to a centralized facility for analyses.

A. Spectral features

Difference in spectra was obtained by subtracting normalized average spectrum of reference group from all asthma groups: mild, moderate, treated severe and untreated severe (Figure 2 A-D). All positive peaks belong to the pathological groups (mild, moderate, treated severe and untreated severe asthma), while all negative peaks are the features of reference group. These peaks may be the indicative of molecules like proteins, plasma free amino acids and DNA with relatively higher concentrations persisting in the pathological (asthmatic) groups' sera.

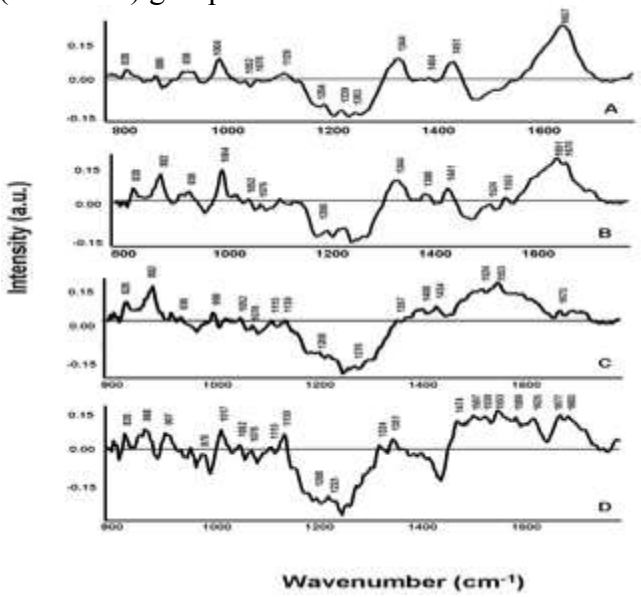

Figure 2.Difference spectra of the asthma groups.

A. Mild asthma-reference, B. Moderate asthma-reference, C. Treated severe asthma-reference, D. Untreated severe asthma-reference.

In the untreated severe difference spectra, increased number of positive peaks could be observed in the same region. The bands observed could be attributed to the enhanced immune hyper-responsiveness in severe asthmatic conditions that might lead to a higher secretion of histamines, leukotrienes and prostaglandins and the increased deposition of glycosaminoglycans (like galactosamine, glucoronic acid and glucosamine) in the airways.

IV. CONCLUSION

Preliminary findings indicated the possibility of classifying reference and asthma conditions distinctly, as well as specific classifications based on the state of severity of the asthmatic grades. Spectral comparisons indicate changes in protein structure, increased DNA and possible presence of molecules like histamine, prostaglandins, leukotrienes and glycosaminoglycans (GAGs). Treated and untreated severe groups were classified distinctly, thus indicating that treatment related changes may also be detected using RS. Further, subjects with other pulmonary disorders like, chronic obstructive pulmonary disorder, cystic fibrosis, sarcoidosis, tuberculosis and bronchiectasis would be included to determine disease specificity of the stated method.

ACKNOWLEDGMENT

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The Implimentation and Structure of Object Character Intelligence Recognition Perform Via Open Source Computer Vision (OpenCV)

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***Abstract*—In this paper, we present a technology which is a computer vision is that the representation in the updation form, OpenCV-Open Source Computer Vision Library we are using as reference for performing our execution and demonstrate the result. The Object Character Recognitiion Is the technology which can recognize and analyze the specific object and that can get the out as text which is the editable form. The Object may be paper, picture which might any format and reali-time desktop or anything else. We are are here defining that the suphrial system which works like intelligence. And also we define the representation of structure and alogorithm in that included.**

***Keywords* –Object Chatacter Recogntion, OpenCv, Computer Vision Library**

IINTRODUCTION

Machine replication of human functions, like reading, is an ancient dream. However, over the last five decades, machine reading has grown from a dream to reality. Optical character recognition has become one of the most successful applications of technology in the field of pattern recognition and artificial intelligence. Many commercial systems for performing OCIR exist for a variety of applications, although the machines are still not able to compete with human reading capabilities.

A. OCIR

By 1950 the technological revolution was moving forward at a high speed, and electronic data processing was becoming an important field. Data entry was performed through punched cards and a cost-effective way of handling the increasing amount of data was needed. At the same time the technology for machine reading was becoming sufficiently
mature for application, and by the middle of the 1950's OCR machines became commerciallyavailable. The first true OCR reading machine was installed at Reader's Digest in 1954. This equipment was used to convert typewritten sales reports into punched cards for input to thecomputer.

OCR (Object Character Recognition) also called Object Character Reader is a system that provides a full alphanumeric recognition of printed or handwritten characters at electronic speed by simply scanning the form.

More recently, the term Intelligent Character Recognition (ICR) has been used to describe the process of interpreting image data, in particular alphanumeric text.

One example of OCR is shown below. A portion of a scanned image of text, borrowed from the web, is shown along with the corresponding (human recognized) characters from that text.

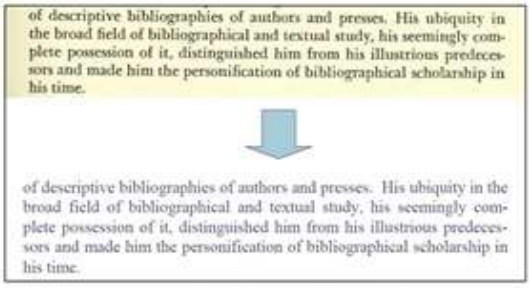

Fig 1- Sacanned Image of Text and in corresponding recognized organiation

A few examples of OCR applications are listed here. The most common for use OCR is the first item; people often wish to convert text documents to some sort of digital representation.
1. People wish to scan in a document and have the text of that document available in a word processor.

2. Recognizing license plate numbers.

B.Methods of OCR

The main principle in automatic recognition of patterns, is first to teach the machine which classes of patterns that may occur and what they look like. In OCR the patterns are letters, numbers and some special symbols like commas, question marks etc., while the different classes correspond to the different characters. The teaching of the machine is performed by showing the machine examples of characters of all the different classes. Based on these examples the machine builds a prototype or a description of each class of characters. Then, during recognition, the unknown characters are compared to the previously obtained
descriptions, and assigned the class that gives the best match.

C.Components of an OCR system

A typical OCR system consists of several components. In figure 3 a common setup is illustrated. The first step in the process is to digitize the analog document using an optical

scanner. When the regions containing text are located, each symbol is extracted through a
segmentation process. The extracted symbols may then be preprocessed, eliminating noise, to facilitate the extraction of features in the next step.

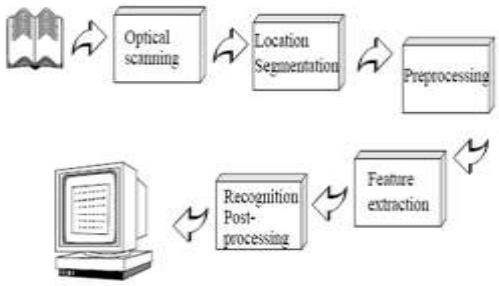

Figure 3 : Components of an OCR-system

The identity of each symbol is found by comparing the extracted features with descriptions of the symbol classes obtained through a previous learning phase. Finally contextual information is used to reconstruct the words and numbers of the original text.

II FUNCTION OF OCR:

- Forms can be scanned through a scanner and then the recognition engine of the OCR system interpret the images and turn images of handwritten or printed characters into ASCII data (machine-readable characters).
- The technology provides a complete form processing and documents capture solution.
- Allows an open, scaleable and workflow.
- Includes forms definition, scanning, image
- pre-processing, and recognition capabilities

Advantages:

- Quicker processing; no moving or storage of questionnaires near operators.
- Savings in costs and efficiencies by not having the paper questionnaires.
- Scanning and recognition allowed efficient management and planning for the rest of the processing workload.
- Reduced long term storage requirements, questionnaires could be destroyed after the initial scanning, recognition and repair.
- Quick retrieval for editing and reprocessing.
- Minimizes errors associated with physical handling of the questionnaires.

III THE FUTURE OF OCR

Through the years, the methods of character recognition has improved from quite primitive schemes, suitable only for reading stylized printed numerals, to more complex and sophisticated techniques for the recognition of a great variety of typeset fonts and also handprinted characters. Below the future of OCR when it comes to both research and areas
of applications, is briefly discussed.

A..Future improvements

New methods for character recognition are still expected to appear, as the computer technology develops and decreasing computational restrictions open up for new approaches.
There might for instance be a potential in performing character recognition directly on
grey level images. However, the greatest potential seems to lie within the exploitation of
existing methods, by mixing methodologies and making more use of context.

IV OPENCV

Open Source Computer Vision Library (OpenCV) and also provides a general background to the field of computer vision sufficient to use OpenCV effectively.

Computer vision is a rapidly growing field, partly as a result of both cheaper and more capable cameras, partly because of affordable processing power, and partly because vi- sion algorithms are starting to mature. OpenCV itself has played a role in the growth of computer vision by enabling thousands of people to do more productive work in vision. With its focus on real-time vision, OpenCV helps students and professionals efficiently implement projects and jump-start research by providing them with a computer vision and machine learning infrastructure that was previously available only in a few mature research labs.

A. Computer Vision

Computer vision is the transformation of data from a still or video camera into either a decision or a new representation. All such transformations are done for achieving some particular goal. The input data may include some contextual information such as “the camera is mounted in a car” or “laser range finder indicates an object is 1 meter away”. The decision might be “there is a person in this scene” or “there are 14 tumor cells on this slide”. A new representation might mean turning a color image into a grayscale im- age or removing camera motion from an image sequence.

V. WORKING OF TESSERACT

In geometry, the tesseract, also called an 8-cell or regular octachoron or cubic prism. Is the four-dimensional analog of the cube; the tesseract is to the cube as the cube is to the square. Just as the surface of the cube consists of 6 square faces, the hyper surface of the tesseract consists of 8 cubical cells.

Tesseract is object character recognition engine for various operating systems. Tesseract is considered one of the most accurate open source OCR engines currently available. It is written in the C, C++, so it is platform independent. It can be used in other applications in the form of Dynamic Link Library (DLL). So it can be easily added as the reference in the form of DLL in other application to use the functionality provided by Tesseract.

A. Architecture Of Tesseract OCR Engine

Tesseract OCR works in step by step manner as per the block diagram shown in fig. First step is Adaptive Thresholding, which converts the image into binary images. Next step is connected

component analysis, which is used to extract character outlines. This method is very useful because it does the Tesseract was probably first to provide this kind of processing. Then after, the outlines are converted into Blobs. Blobs are organized into text lines, and the lines and regions are analyzed for some fixed area or equivalent text size. Text is divided into words using definite spaces.

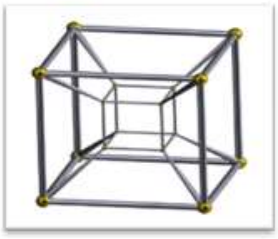

Fig.1.Concept of Tessaract

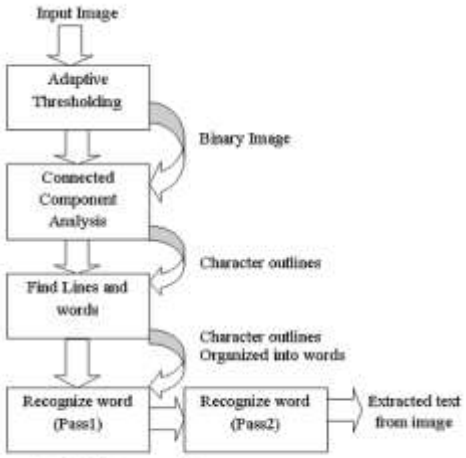

Fig.2.Architecture of Tesseract

process as shown in fig 1. In the first pass, an attempt is made to recognize each word fromthe text. Each word passed satisfactory is passed to an adaptive classifier as training data..The adaptive classifier tries to recognize text in more accurate manner. As adaptive classifier has received some training data it has learn something new so final phase is to resolve various issues and to extract text from images.

Advantages:

- Tesseract is Open source
- Tesseract provides results with 100% accuracy. When the image is gray. and 61% accuracy (complex color image)
- Platfom independent
- Tesseract solve the problem of different word spacing

CONCLUSION

The specializes character classification to the typeface of the current document, while the third exploits style consistency in typeset text. The method depends only on properties, and varies from language to language. While at first blush these four notions seem very different, we shall see that the borders are fuzzy.Although Tesseract is command-based tool but as it is open source and it is available in the form of Dynamic Link Library, it can be easily made available in graphics mode. The input images are specific, which are vehicle number plates, so in these specific images Tesseract provides better accuracy.

ACKNOWLEDGEMENT

We would like to Thanks Prof. S. R.Patil, Department of Computer Engineering, DBNCOET, Yavatmal for kind support and guidance to carry out this work.

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Constant Frequency Unified Power Flow Controller for Wind Power Generator connected With Micro Grid

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***Abstract*— The paper proposes the application of constant frequency unified power quality conditioner to overcome the power quality issues in fixed speed wind mill connected with the micro grid. The power circuit of a constant frequency unified power flow controller (CF-UPFC) is based on a combination of UPFC, and frequency regulator (matrix converter). This equipment incorporates compensation functions like voltage sag, voltage swell, reactive power compensation, current harmonic rejection, and also provides frequency regulation. Integrated series and parallel active filter (UPFC) is a universal solution for the most power quality problems. The main drawback is that it cannot regulate the supply frequency variation. Here CF-UPFC the matrix converter is used for frequency regulation. This integration, the compensator compensates all the power quality issue for fixed speed induction wind generator. Simulation results are presented to confirm that this approach has better performance over the existing power quality conditioners for FSIWG connected with micro grid.**

Keywords*— *Micro Grid, UPFC, Matrix converter, CF-UPFC, FSIWG.

XXX. INTRODUCTION

A micro grid is a combination of interconnected distributed generators, loads and intermediate storage units that cooperate with each other to be collectively treated by the grid. Micro grid can operate in grid-connected mode or in island mode. In grid connected mode, the micro grid either draws or supplies power to the main grid, depending on the generation and load. Power quality events and pre-set conditions will make the micro grid disconnect from the main grid and operate as a separate island. Typical micro gird sources include combustion engines, small wind turbines and photovoltaic systems [1]. The main problem in micro grid is power quality issues when connected to heavy loads. If the load increases frequency and voltage will vary [2].If the supply frequency and voltage varies beyond the power quality, the utility equipment may not work properly.

A unified power flow controller is an advanced concept in the power quality control field. The unified power flow controller is implemented based on the idea of integration of a series active filter and shunt active filter that share a single DC link [4]. Unified power flow controller can be applied in a power system for current harmonic compensation, voltage compensation and reactive power control [5].but the main drawback is that it cannot compensate frequency regulation. This drawback is overcome by introducing constant frequency unified power flow controller **(**CF-UPFC**)[6]** . CF-UPFC which is a combination of unified power flow controller and matrix converter.This modified unified power flow controller the PWM converter to perform active filtering, and the matrix converter also performs the function of frequency regulation.The Pulse Width Modulation technique (PWM) is commonly used to control all these converters. The switching rate is high so the PWM converter can produce a controlled current or voltage waveform with high fidelity. [7]. It can simultaneously compensate the load current harmonics**,** supply voltage harmonics and frequency regulation.

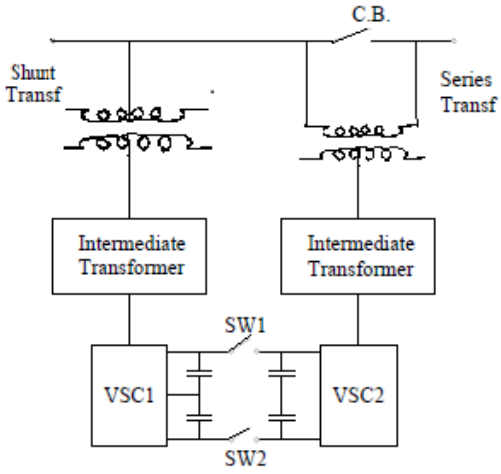


Fig 1 a UPFC schematic

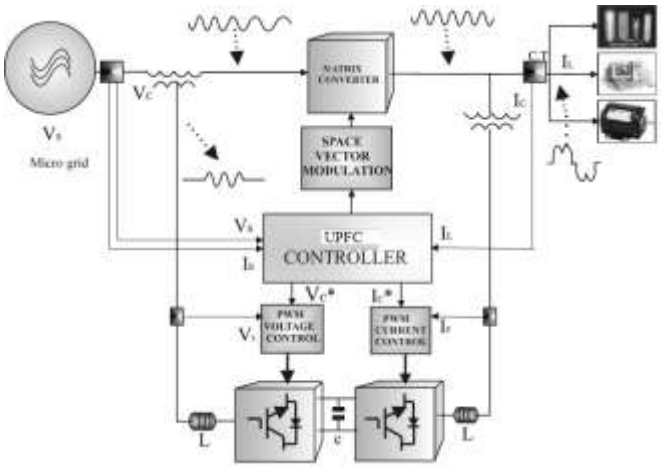


Fig 2 Basic configuration of unified power flow controller

Fig. 2 shows an arrangement of the constant frequency unified power flow controller. The constant frequency unified power flow controller can solve all power quality issues like voltage sag, voltage swell, and eliminate current harmonics and frequency regulation (by using the matrix converter). Matrix converter has many advantages when compared to traditional frequency changers. Matrix converter can convert the supply frequency in a wide range [8].It can also compensate the voltage sag and swell efficiently by adjusting the modulations [9][10]. In Matrix converter, (MC) it is possible to control the phase angle between the voltage and current on the output. Size, high power density and easier maintenance are the attractive characteristics of matrix converter. Sinusoidal input current, controlled input power factor, regeneration capability and magnitude-frequency controlled output voltages are the advantages of a matrix converter. In this paper CF-UPFC has been implemented in micro grid connected wind mill and analyzed its performance has been analyzed.

II. Power Quality Issues In Wind Mill Connected With Micro Grid

A perfect power supply would be one that is always available and always within voltage and frequency tolerances, and has a pure noise-free sinusoidal wave shape. Power quality issues are the important problems in micro grids. Especially, for wind turbine generator systems, there are some international standards available that characterize the power quality of a grid connected wind turbine IEC 61400-21and EN 50160 standards.

A. Voltage unbalance

According to the electricity board, the variation in the steady state voltage is in the range from + 5% to –15% at the wind turbine terminals in the wind farms. For low voltages, the noload losses decrease slightly due to reduced iron losses, whereas the full-load losses (i.e. losses at rated power) increase due to increased currents in the generator windings and also reduce the power reduction. Too low voltages can cause the relay protection to trip the wind turbines.

B. Frequency range

According to electricity boards and manufacturers, the grid frequency in India can vary from 47 to 51.5 Hz. Most of the time, the frequency is below the rated 50 Hz. For wind turbines with induction generators directly connected to the micro grid, frequency variation will be very considerable. Frequency variation is directly affected by the power production of wind mill [11].

C. Harmonics and inter harmonics

The emission of harmonic and inter harmonic currents from wind turbines with directly connected induction generators is expected to be negligible. But Wind turbines connected to the grid through power converters however emit harmonic and/or inter harmonic currents that contribute to the voltage distortion. Inverters based on new technologies have a limited emission of harmonics at lower frequencies compared to the converters used in the first generation of variable speed wind turbines. Instead they produce inter harmonics at higher frequencies. Due to this harmonics the wind turbines generator affects

*High System Losses
* Generator Overheating
* Low Power Factor
* Electronic Protective Device Malfunction
* High Telephone Interference Factor
* Increased generator Vibration

III. SYSTEM CONFIGURATION OF CONSTANT FREQUENCY UNIFIED POWER FLOW CONTROLLER

A. Construction

The basic components of the CF-UPFC is the voltage source inverter (VSI's) sharing a common DC storage capacitor and a matrix converter connected to the power system through coupling transformers. One VSI is connected parallel to the transmission line via a shunt transformer, while the other one is connected in series through a series transformer. The series converter is connected in series with the supply through a transformer *(T1,T2,T3)* while shunt converter is connected in parallel with the passive filter(LP(1,2,3)RP(1,2,3))and (RP(1,2,3)CP(1,2,3)). The passive filters are used to minimize the switching oscillation in the converter output. Each converter
and filter consists of three single phase voltage-source PWM inverters using power IGBTs. The shunt converter

compensates the reactive power, voltage stability and current harmonic rejection .The series converter controls the power flow to the utility, voltage regulation and voltage harmonic rejection. The dc terminals of the inverters are connected to each other with a dc capacitor. of 2200 pF. The matrix converter is used to regulate the supply frequency to the fixed speed induction wind turbine generator. A detailed UPLM construction scheme is shown in fig.3 .The main circuit of the constant frequency unified power quality conditioner consists ofmatrix converter placed in between the series converter and shunt converter arranged as per the circuit diagram. This type of arrangement is called as tandem based converter. This type of arrangement can avoid the limitations of matrix converter [13][14]. The matrix converter consists of a single-stage converter which has an array of mxn *(3X3)* bidirectional power switches to link. It consists of nine bidirectional switches arranged in three groups, each being associated with an output line. This bi-directional switches arrangement connects mxn of the input lines to mxn of the output lines. Commonly, the matrix converter can change the input frequency to the output. In this paper the power rating of matrix converter is 450 KVA, the input voltage of three phases 440 V, and the frequency of output is 50 Hz regulated.

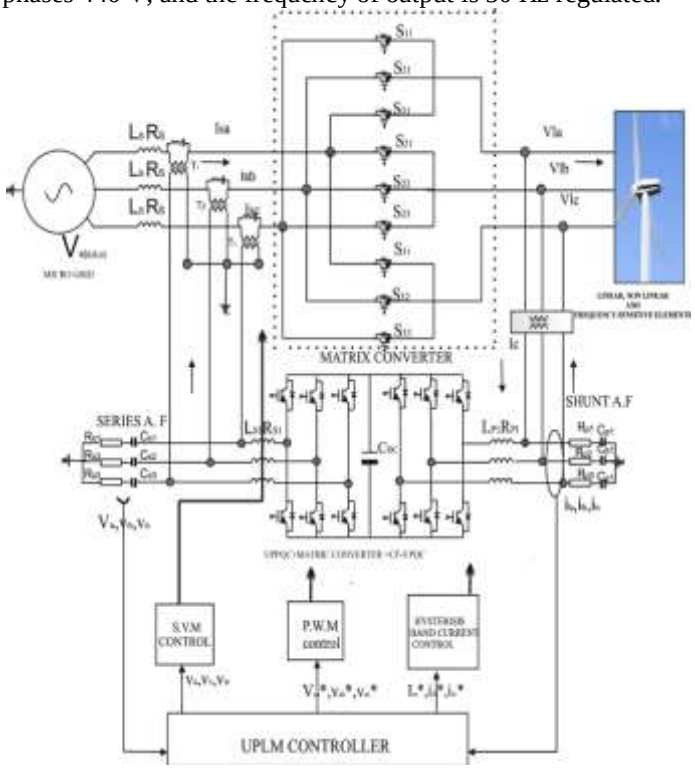


Figure. 3. The Proposed constant frequency unified power quality conditioner for wind mill

The constant frequency unified power quality conditioner consists of two voltage source inverters connected back to back each sharing a common dc link. One inverter is controlled as a variable voltage source in the series active filter (APF), and the other as a variable current source in the shunt APF. Fig. 3 shows a basic system configuration of a general UPFC consisting of the combination of a series APF and shunt APF. The main aim of the series APF is harmonic isolation between load and supply. It has the capability of voltage imbalance compensation as well as voltage regulation and harmonic compensation at the PCC. It also solves the drawback of voltage transfer ratio of matrix converter and output voltage harmonic of matrix converter. The shunt APF is used to absorb current harmonics, compensate for reactive power and negative-sequence current, and regulate the dc link voltage between both APFs. It also solves the input current harmonics of the matrix converter.

B Matrix Converter Working Principle

A matrix with elements S*ij*, represents the state ofeach bi-directional switch (*on=1, off=0*),which can be used to represent the matrix output voltages (V*u*, V*v*, V*w*) as functions of the input voltages (Va, Vb, Vc) as follows,

$$\begin{bmatrix} V_u \\ V_v \\ V_w \end{bmatrix} = \begin{bmatrix} S_{11} & S_{12} & S_{13} \\ S_{21} & S_{22} & S_{23} \\ S_{31} & S_{32} & S_{33} \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix} \quad (1)$$

The input phase currents (*ia, ib, ic*) are related to the output phase currents (*iu, iv, iw*) by,

$$\begin{bmatrix} i_a \\ i_b \\ i_c \end{bmatrix} = \begin{bmatrix} S_{11} & S_{21} & S_{31} \\ S_{12} & S_{22} & S_{32} \\ S_{31} & S_{23} & S_{33} \end{bmatrix} \begin{bmatrix} i_u \\ i_v \\ i_w \end{bmatrix} \quad (2)$$

Assume that the input voltages of the converter system of balanced sinusoidal waveform as.

$$\begin{bmatrix} V_{ia}(t) \\ V_{ib}(t) \\ V_{ic}(t) \end{bmatrix} = \begin{bmatrix} V_i^m \sin(\omega_i^t) \\ V_i^m \sin(\omega_i^t - \frac{2\pi}{3}) \\ V_i^m \sin(\omega_i^t - \frac{4\pi}{3}) \end{bmatrix} \quad (3)$$

Where V^m_i and ωi are the amplitude and the angular frequencyof the input voltages, respectively. The output voltages aredesired to be balanced sinusoidal waveforms. Consider adesired output phase of voltage as

$$V_{oa}(t) = V_o^m \sin(\omega_o^t + \delta) \quad (4)$$

Where $V^m_o$and ωo are the amplitude and the angular frequency of the converter output voltage respectively.

IV. CONTROL SCHEMES OF CONSTANT FREQUENCY

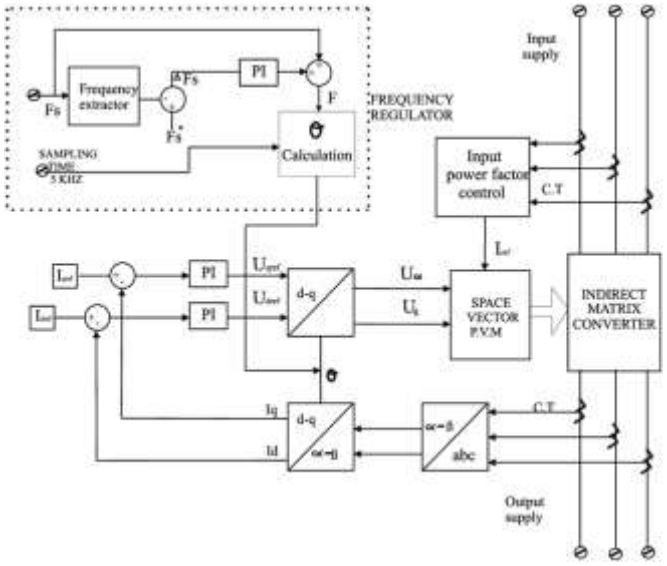


Fig 4 UNIFIED POWER FLOW CONTROLLER for windmill

The control system of Universal Power Line Manager consists of three sections

A. Frequency Regulating Control Block

The control diagram of the Matrix converter basedfrequency regulated power supply for Utility is shown in Fig.4. Control system of frequency regulator in matrix Conventional space vector pulse width modulation is used to switch the matrix converter. The control method of this frequency regulator is similar to that of the flux oriented vector control technique of AC motor drives. The speed control loop is omitted and the coordinate transformation angle □is calculated, according to the output frequency *f* Converter and the sampling time *t*. The supply frequency *fs*, is compared with the reference frequency *fs**.The frequency error signal *⊿fs* is applied to a frequency regulator/ controller. Usually the PI (proportional-integral) type controller generates the reference frequency *fref*. When *fref* is added to *fs*, the required supply frequency *fref** is obtained. This *fref** is fed to the PLL which produce the corresponding θ(sin θ,cos θ). The reference output voltage vector (represented by*Uα* ,*Uβ*) is provided by the output current controller, and the reference input current vector (represented *by I ref*) is determined by the input voltages and the input displacement angle θ through the input power factor control. The output currents have been transformed i(abc)into i(α,β). This can be written as

$$\begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} 1 & -\frac{1}{2} & -\frac{1}{2} \\ 0 & \frac{\sqrt{3}}{2} & -\frac{\sqrt{3}}{2} \end{bmatrix} \begin{bmatrix} i_a \\ i_b \\ i_c \end{bmatrix} \quad (5)$$

Then it is converted to (d q) reference frame (park transform)

$$\begin{bmatrix} i_d \\ i_q \end{bmatrix} = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} \quad (6)$$

The magnitude of output current can be controlled by setting the values of *i*dref, *i*qref .idiqcompared with reference value and corresponding voltages are generated. Again it converted in to Clark transformation. It can be written as

$$\begin{bmatrix} V_\alpha \\ V_\beta \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} V_d \\ V_q \end{bmatrix} \quad (7)$$

When the above values are fed to the voltage controller (d-q), the phase voltage U *u*, U*v* and U*w* will be obtained. After the anti-transformed phase voltages (*U u*,*U v*and*Uw*) the coordinate

systems are obtained. Depending upon the control signal the space vector modulator produces corresponding pulse width modulation (PWM) signal to the matrix converter.

B. Voltage sag swell control

The function of the series APF is to compensate the voltage disturbance in the source side, which is due to the fault in the distribution line at the PCC. The series APF control algorithm calculates the reference value to be injected by the series Active Power Filter (APF) transformers, comparing thepositive-sequence component with the load side line voltages. The proposed series APF reference voltage signal generation system is shown in Fig. 4. In equation (8), supply voltages v(Sabc) are transformed to d-q-0 coordinates

$$\begin{bmatrix} V_{s0} \\ V_{sd} \\ V_{sq} \end{bmatrix} = \frac{2}{3} \begin{bmatrix} \frac{1}{2} & \frac{1}{2} & \frac{1}{2} \\ \sin(\omega t) & \sin(\omega t - 2\frac{\pi}{3}) & \sin(\omega t + 2\frac{\pi}{3}) \\ \cos(\omega t) & \cos(\omega t - 2\frac{\pi}{3}) & \cos(\omega t + 2\frac{\pi}{3}) \end{bmatrix} \begin{bmatrix} V_{sa} \\ V_{sb} \\ V_{sc} \end{bmatrix} \quad (8)$$

The voltage in d axes (vSd) given in (9) consists of average and oscillating components of source voltages (*sd v* and *sd v*~). The average voltage *sd v* is calculated by using second order LPF (low pass filter).

$$v_{sd} = \bar{v}_{sd} + \tilde{v}_{sd} \quad (9)$$

The load side reference voltages *v*Labc* are calculated as given

in equation (10). The switching signals are assessed by comparing reference voltages (*v*Labc*) and the load voltages (*VLabc*) and through sinusoidal PWM controller.

$$\begin{bmatrix} V_{La}^* \\ V_{Lb}^* \\ V_{Lc}^* \end{bmatrix} = \frac{2}{3}\begin{bmatrix} \sin(\omega t) & \cos(\omega t) & 1 \\ \sin(\omega t - 2\frac{\pi}{3}) & \cos(\omega t + 2\frac{\pi}{3}) & 1 \\ \sin(\omega t + 2\frac{\pi}{3}) & \cos(\omega t + 2\frac{\pi}{3}) & 1 \end{bmatrix}\begin{bmatrix} \bar{v}_{sd} \\ 0 \\ 0 \end{bmatrix} \quad (10)$$

These three-phase load reference voltages are compared with load line voltages and errors are then processed by sinusoidal PWM controller to generate the required switching signals for series APF IGBT switches.

C. current Harmonics Control

The shunt APF described in this part is used to compensate the current harmonics and reactive power generated by the nonlinear load. The shunt APF reference current signal generation block diagram is shown in Fig. 5. The instantaneous reactive power (*p*-*q*) theory is used to control shunt APF in real time. In this theory, the instantaneous three-phase currents and voltages are transformed to (α-β-0)

$$\begin{bmatrix} V_0 \\ V_\alpha \\ V_\beta \end{bmatrix} = \sqrt{\frac{2}{3}}\begin{bmatrix} 1/\sqrt{2} & 1/\sqrt{2} & 1/\sqrt{2} \\ 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix}\begin{bmatrix} V_{sa} \\ V_{sb} \\ V_{sc} \end{bmatrix} \quad (11)$$

$$\begin{bmatrix} i_0 \\ i_\alpha \\ i_\beta \end{bmatrix} = \sqrt{\frac{2}{3}}\begin{bmatrix} 1/\sqrt{2} & 1/\sqrt{2} & 1/\sqrt{2} \\ 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix}\begin{bmatrix} i_{sa} \\ i_{sb} \\ i_{sc} \end{bmatrix} \quad (12)$$

Coordinates as show in equation (11) and (12).

The source side instantaneous real and imaginary power components are calculated by using source currents and

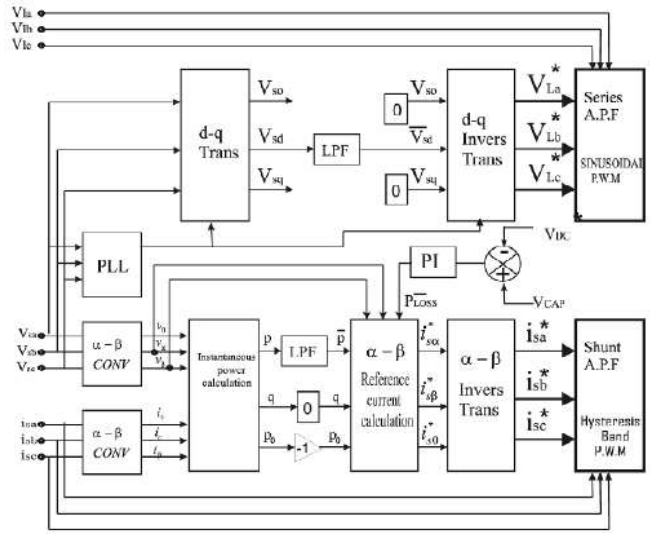


Fig 5 Control system of shunt and series active filter

Phase-neutral voltages as given in (13). The instantaneous real and imaginary powers include both oscillating and average components as shown in (14). Average components of p and q consist of positive sequence components (p and q) of source current. The oscillating components (p ~ and q~) of p and q include harmonic and negative sequence components of source currents. In order to reduce neutral current, p0 is calculated by using average and oscillating components of imaginary power and oscillating component of the real power as given in equation (14). $i_{s\alpha}$ $i_{s\beta}$ $i_{s0}$are the reference currents of shunt APF in α, β coordinates. These currents are transformed to
three-phase system as shown in (15).

$$\begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} v_\alpha & v_\beta \\ -v_\beta & v\alpha \end{bmatrix}\begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} \quad (13)$$

$$p_0 = v_0 * v_0$$

$$p = \bar{p} + \tilde{p} \quad (14)$$

$$\begin{bmatrix} i_{sa}^* \\ i_{sb}^* \\ i_{sc}^* \end{bmatrix} = \sqrt{\frac{2}{3}}\begin{bmatrix} 1/\sqrt{2} & 1 & 0 \\ 1/\sqrt{2} & -1/2 & \sqrt{3}/2 \\ 1/\sqrt{2} & -1/2 & -\sqrt{3}/2 \end{bmatrix}\begin{bmatrix} i_{s0}^* \\ i_{s\alpha}^* \\ i_{s\beta}^* \end{bmatrix} \quad (15)$$

The reference currents are calculated in order to compensate neutral, harmonic and reactive currents in the load. These reference source current signals are then compared with threephase source currents, and the errors are processed by hysteresis band PWM controller to generate the required switching signals for the shunt APF switches in expressed in the equation [15].

V. Simulation Result

To validate the effectiveness of the proposed system based wind mill, different cases have been examined for this study. In the proposed topology simulations are carried out using MAT LAB/ SIMULINK for voltage sag, current harmonics, and
frequency regulation investigations. Results of each test are described below. All the simulations are simulated with the discrete sampling time of T=t/ts. (sec).Here ts=3*104 and t is the one cycle period of the wave form.

A Voltage sag

In Fig. 6 the CF-UPFC compensates the sag and swells voltage effectively as shown in the simulation result. During the sag and swell condition the wind power production is

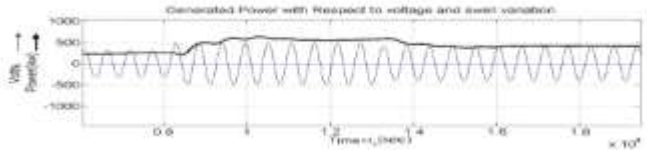


Fig 6:power production against voltage sag swell condition

affected as shown in figure(6). After implementing CF-UPFC, the sag and swell is not affected by the wind production as shown in figure(7).

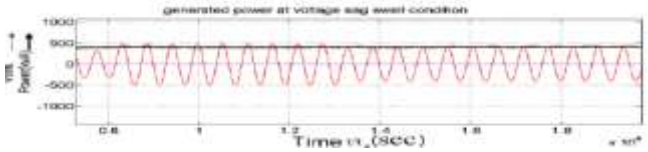


Fig.7.CF-UPFC based compensated power production voltage sag, swell condition

B Current harmonics

The matrix converter draws non sinusoidal current from the power supply as shown in figure 8. In the figure the current total harmonic distortion is 100 %.

Figure.7.supply current before CF-UPQC

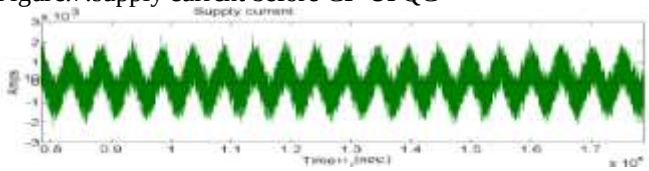
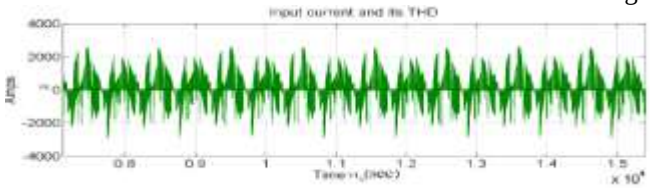


Fig.9. Supply current after CF-UPQC implemented in wind mill

Fig. 9 shows that after the implementation of CF-UPQC, the input current goes to sinusoidal. It effectively compensates the current harmonics. The simulation result shows the single



phase only. The total current is 20KA. The simulation iscarried out for a period of 0.2 sec to 0.57sec as shown in figure9.

C . Power frequency variation control

Here the supply frequency is 50 Hz at normal condition. The permissible limit of the supply frequency is 49.5Hz to 50.51Hz

particularly for FSIWTG. But in micro grid it will vary from 47 -52Hz. In this supply frequency, the variation of the wind mill power production will be affected. When the supply frequency increases rapidly, the generator power production rapidly decreases from 400 KW to 100KW rapidly as shown in the figure 10.

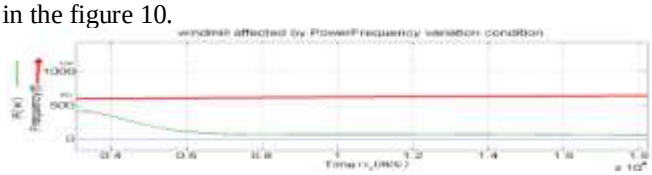


Fig .10 .supply frequency (vs) power production

After the implementaion of the CF-UPFC the windmillterminal frequency is 50 Hz constant when the input frequencyvariation condition.so the power production by wind mill

also constant shown in figure 11.

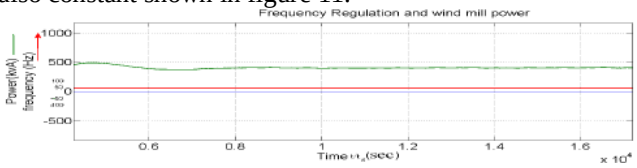


Fig.11. supply frequency (vs) power production

VI. CONCLUSION

This paper has investigated the effects of fixed speed Wind turbine generator on voltage sag, voltage swell and supply frequency variation conditions. A new system constant frequency unified power flow controller (CF-UPFC) has been proposed to evaluate the wind mill connected with microgrid system. Simulation studies have been carried out in MATLAB/SIMULINK software to examine the impacts of FSIWTG on the steady-state under unbalanced, supply frequency fluctuation conditions. This new power quality conditioner compensates the voltage sag, swell, supply frequency and mitigates the current harmonics. Simulation shows that the CFUPFC behaves satisfactorily during steady state and transient periods. The proposed system effectively mitigates almost all power quality issues present in the windmill.

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A survey on Adaptive Clustering Routing Protocol using Twice Cluster Head Selection

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ABSTRACT

Networking together hundreds or thousands of cheap microsensor nodes allows users to accurately monitor a remote environment by intelligently combining the data from the individual nodes. These networks require robust wireless communication protocolsthat are energy efficient and provide low latency. In this paper, we develop and analyze low-energy adaptive clustering hierarchy (LEACH), a protocol architecture for microsensor networks that combines the ideas of energy-efficient cluster-based routingand media access together with application-specific data aggregation to achieve good performance in terms of system lifetime, latency, and application-perceived quality. LEACH includes a new, distributed cluster formation technique that enables self-organization of large numbers of nodes, algorithms for adapting clusters and rotating cluster head positions to evenly distribute the energyload among all the nodes, and techniques to enable distributed signal processing to save communication resources. Our results show that LEACHcan improve system lifetime by an order of magnitude compared with general-purpose multihop approaches.

***Index Terms*— Data aggregation, protocol architecture, wireless microsensor networks.**

1. INTRODUCTION

ADVANCES in sensor technology, low-power electronics, and low-power radio frequency (RF) design have enabled the development of small, relatively inexpensive and low-power sensors, called *microsensor*, that can be connected via a wireless network. These wireless microsensor networks represent a new paradigm for extracting data from the environment and enable the reliable monitoring of a variety of environments for applications that include surveillance, machine failure diagnosis, and chemical/biological detection. An important challenge in the design of these networks is that two key resources—communication bandwidth and energy—are significantly more limited than in a tethered network environment. These constraints require innovative design techniques to use the available bandwidth and energy efficiently.

In order to design good protocols for wireless microsensor networks, it is important to understand the parameters that are relevant to the sensor applications. While there are many ways in which the properties of a sensor network protocol can be evaluated, we use the following metrics.

A. Ease of Deployment

Sensor networks may contain hundreds or thousands of nodes, and they may need to be deployed in remote or dangerous environments, allowing users to extract information in ways that would not have been possible otherwise. This requires that nodes be able to communicate with each other even in the absence of an established network infrastructure and predefined node locations.

B. System Lifetime

These networks should function for as long as possible. It may be inconvenient or impossible to recharge node batteries. Therefore, all aspects of the node, from the hardware to the protocols, must be designed to be extremely energy efficient.

C. Latency

Data from sensor networks are typically time sensitive, so it is important to receive the data in a timely manner.

D. Quality

The notion of "quality" in a microsensor network is very different than in traditional wireless data networks. For sensor networks, the end user does not require all the data in the network because

The data from neighbouring nodes are highly correlated, making the data redundant and the end user cares about a higher-level description of events occurring in the environment being monitored.

2. BACKGROUND

Since both device and battery technology has only recentlymatured to the point where microsensor nodes are feasible, this is a fairly new field of study. Researchers have begun discussing not only the uses and challenges facing sensor

networks, but have also been developing preliminary ideas as tohow these networks should function as well as theappropriate low-energy architecture for the sensor nodes themselves.

There have been some application-specific protocols developedfor microsensor networks. Clare *et al.* developed a timedivisionmultiple-access (TDMA)MAC protocol for low-energy operation. Using a TDMA approach saves energy by allowingthe nodes to remain in the sleep state, with radios powered-down, for a long time. Intanagonwiwat *et al.* developed directeddiffusion, a protocol that employs a data-driven model to achieve low-energy routing.

Recently, there has been much work on "power-aware"routing protocols for wireless networks. In theseprotocols, optimal routes are chosen based on the energy ateach node along the route. Routes that are longer, but whichuse nodes with more energy than the nodes along the shorterroutes, are favoured, helping avoid "hot spots" in the network.In LEACH, we use randomized rotation of the cluster headpositions to achieve the same goal.

Another method of wireless communication is to use *clustering.*In this case, nodes send their data to a central *clusterhead* that forwards the data to get it closer to the desired recipient.Clustering enables bandwidth reuse and can, thus, increasesystem capacity. Using clustering enables better resource allocationand helps improve power control.

While conventional cluster-based networks rely on a fixed infrastructure, new research is focusing on ways to deploy clusteringarchitectures in an ad-hoc fashion. Earlywork by Baker *et al.* developed a linked cluster architecture,where nodes are assigned to be ordinary nodes, clusterhead nodes, or gateways between different clusters. Thecluster heads act as local control centres, whereas the gatewaysact as the backbone network, transporting data betweenclusters. This enables robust networking with point-to-pointconnectivity. Another ad-hoc clustering protocol, the near termdigital radio (NTDR), uses a clustering approach with a two-tierhierarchical routing algorithm. Nodes form local clusters,and intra-cluster data are sent directly from one node to thenext, whereas inter-cluster data are routed through the clusterhead nodes. This protocol enables point-to-point connectivityand does not use low-energy routing or MAC; therefore, it isnot suited for microsensor networks. LEACH builds on this work by creating a new ad-hoc cluster formation algorithm thatbetter suits microsensor network applications.

3. Literature Survey

3.1 A survey on sensor networks

The authorspresent communication architecture for sensor networks and proceed to survey the current research pertaining to all layers of the protocol stack: Physical, Data Link, Network, Transport and Application layers.

A sensor network is defined as being composed of a large number of nodes which are deployed densely in close proximity to the phenomenon to be monitored. Each of these nodes collects data and its purpose is to route this information back to a sink. The network must possess self-organizing capabilities sincethe positions of individual nodes are not predetermined. Cooperation among nodes is the dominant feature of this type of network, where groups of nodes cooperate to disseminate the information gathered in their vicinity to the user.

Major differences between sensor and ad-hoc networks:

- Number of nodes can be orders of magnitude higher.
- Sensor nodes are densely deployed
- Sensor nodes are prone to failure.
- Frequent topology changes.
- Broadcast communication paradigm.
- Limited power, processing and power capabilities.
- Possible absence of unique global identification per node.

The authors point out that none of the studies surveyed has a fully integrated view of all the factors drivingthe design of sensor networks and proceeds to present its own communication architecture and designfactors to be used as a guideline and as a tool to compare various protocols. After surveying the literature,this is our impression as well and we include it in the open research issues that can be explored for futurework. The design factors listed by the authors:

- Fault Tolerance: Individual nodes are prone to unexpected failure with a much higher probability thanother types of networks. The network should sustain information dissemination in spite of failures.
- Scalability: Number in the order of hundreds or thousands. Protocols should be able to scale to such high degree and take advantage of the high density of such networks.
- Production Costs: The cost of a single node must be low, much less than $1.
- Transmission Media: RF, Infrared and Optical.
- Power Consumption: Power conservation and power management are primary design factors.

3.2 Directed Diffusion: A Scalable and Robust Communication

Problem

Sensor networks have different requirements than other wireless networks. The need for robustness andscalability leads to the design of localized algorithms,

where sensors only interact with other sensors in restricted vicinity and have at best an indirect global view.

Approach

The authors argue in favour of designing localized algorithms and present directed diffusion as a set ofabstractions that describe the communication patterns underlying such algorithms. The design featuresdiffer from traditional wireless networks and are data-centric and application-specific.

Data-centric refers to the fact that in sensor networks we are mostly interested in retrieving informationmatching certain attribute values and very rarely we will be interested only in data from a specific node. Thisapproach decouples data from the sensor that produced it and unique identification of nodes is of secondary importance. Application-specific refers to the awareness across all layers of the specific application so thatintermediate nodes can perform data aggregation, caching and informed forwarding.

The authors proceed to describe a two-level cluster formation algorithm, where cluster heads are elected based on available energy. They present a localized algorithm for object tracking to demonstrate the difficulties that arise. The design is difficult because localized algorithms need to produce a certain globalbehaviour with at best indirect global knowledge. Furthermore, localized algorithms tend to be sensitive in the choice of parameter values.

In order to overcome these difficulties, they suggest the design and prototyping of adaptive fidelity algorithms, where the fidelity of the retrieved data can be traded against energy efficiency, network lifetime and network bandwidth. Furthermore, by developing techniques for characterizing the performance of localizedalgorithms it is possible to quantify those tradeoffs and produce the expected behaviour.

The authors propose .directed diffusion. to be used as an abstraction to model the communication patternsof localized algorithms. The data that each sensor generates is characterized by a number of attributes.Other sensors that are interested in a certain type of data, disseminate this interest to the network (in theform of attributes and degree of interest). As the interests disseminate, gradients are established that directthe diffusion of data when it becomes available, i.e., reverse paths are established for data that matches aninterest.

3.3Energy-efficient communication protocol for wireless microsensor networks

The authors present a 2-level hierarchical routing protocol (LEACH) which attempts to minimize globalenergy dissipation and distribute energy consumption evenly across all nodes. This is achieved by theformation of clusters with localized coordination, by rotating the high-energy cluster heads and by locallycompressing data.

The model used in this paper makes the following assumptions:

- There exists one fixed base station with no energy constraints and a large number of sensor nodes that are mostly stationary, homogeneous and energy constrained.
- The base station is located at some distance from the sensor nodes and the communication between a sensor node and the base station is expensive.
- The purpose of the network is to collect data through sensing at a fixed rate (i.e. there is always something to send) and convey it to the base station. The raw data is too much and must be locally aggregated into a small set of meaningful information.

The nodes self-organize into local clusters with one node in each cluster acting as a cluster head. Once a cluster has formed, the cluster members send their data to the cluster head (low energy transmission) which in turn combines the data and sends it to the base station (high energy transmission). This organization of the nodes creates a 2-level hierarchy.

For their analysis, the authors compare their scheme with a direct communication protocol (each sensor sends data directly to the base station) and the minimum-energy routing protocol. In the latter, data destined for the base station is routed through many intermediate nodes that can each be reached with minimum energy transmission. A static clustering scheme is also used where cluster heads are not rotated. Their results indicate that LEACH reduces communication energy by as much as 8x. Also, the first node death inLEACH occurs over 8 times later and the last node dies over 3 times later.

3.4 A Transmission Control Scheme for Media Access in Sensor Networks

Problem

Media access control in sensor networks must be energy efficient and allow fair bandwidth allocation to all the nodes. The authors examine how CSMA based medium access can be adapted for sensor networks. CSMA strategies include listening to the channel before transmission, using explicit positive or negative acknowledgments to signal collision, relying on time synchronized slotted channels or performing collision detection. However, these approaches are not directly applicable due to the characteristics of sensor networks:

- Network operates as a collective structure. Its primary goal is the sampling of the environment and the propagation of the samples, possibly processed and aggregated, toward one or more gateways.
- Traffic tends to be periodic and highly correlated. Conventional schemes make the assumption ofstochastically distributed traffic.
- Every node is both a data source and a router.
- Node capabilities are very restricted.
- Equal cost per unit time for listening, receiving and transmitting.

Approach

The authors outline a CSMA-based MAC and transmission control scheme to achieve fairness while being energy efficient. They categorize media access control mechanisms into listening, backoff, contention

control and rate control mechanisms.Listening combined with backoff mechanism: Neighbouring nodes will sense the same event and attemptto transmit at the same time. According to the proposed scheme, whenever nodes need

to transmit theyintroduce random delay followed by a constant listening period. If the channel is free, then they transmit.Otherwise, they enter in a backoff period, during which the radio is turned off. This backoff period is alsoapplied as a phase shift to the periodicity of the application, aiming to desynchronize nodes.Contention control mechanism: Such a mechanism should use the minimum number of control packets. If the traffic load justifies it, then a combination of request-to-send (RTS) and clear-to-send (CTS) controlpackets can be used.
Rate control mechanism: MAC should control the rate of the originating data of a node in order to allow route-thru traffic to access the channel and reach the base station. The adaptive rate control proposed, usesloss as collision signal to adjust transmission rate in a manner similar to the congestion control in TCP.

- All CSMA schemes achieve good channel utilization and aggregate fairness is almost insensitiveto the presence of backoff. However, backoff plays an important role in maintaining proportional fairness when using a fixed window size or binary exponential decrease in window size.
- Randomness in the pre-collision phase provides robustness.
- Schemes with constant listen period achieve best energy efficiency.
- Following a transmission failure with a random shift in the sampling interval, allows the nodes tobreak away from synchronization which listening and back off fail to detect.

Interesting Points

- The adaptive rate control balances the in-node generated traffic with the route-thru traffic by usingpacket loss as a signal to decrease traffic.
- Notion of a phase shift at the application level to break the periodicity of the sensor sampling.
- Metrics for multihop fairness and energy efficiency (measuring bandwidth delivery to base station)for evaluating MAC schemes.
- Good overview of the purpose and characteristics of sensor networks in the introduction.
- Evaluation platform consists of only 10 nodes with on base station in both single and multihop scenarios.

3.5 The Resurrecting Duckling:

Problem

Provide support for secure transient association between a master and a slave device or between peers in awireless ad-hoc network. Consider, as an example, a universal remote that controls most appliances in yourhome which are networked in a wireless ad-hoc fashion. The remote needs to be associated with each ofthe appliances in a secure way, in the sense that an identical remote purchased by your neighbour will not beable to control these devices.

Approach

The solution proposed is formalised in the Resurrecting Duckling security policy model. The slave device is termed as the duckling and the master controller acts as its mother duck. The name and terminology is inspired by biology and specifically from the fact that a duckling recognizes as its mother the first moving object it sees that makes a sound when it emerges from its egg. This phenomenon is called imprinting.

Consequently, a device can be in one of two states: imprint able (waiting for a shared secret that will associate it with another master device) and imprinted (already associated).

The imprinting can take place with physical electrical contact, which transfers a secret key that binds the device to the specified master forever. In the original model, once a device is associated with another master device, it only obeys that device until it is instructed to become imprint able again.

However, this model was too limiting since it did not allow interaction with other entities. It was extended in the second paper to include the specification of policy where for each action the master device specifies what credentials are required to be presented by a another device in order to request that action.

3.6Talking to strangers: Authentication in adhoc wireless networks

Problem

Provide support for secure communication and authentication in wireless ad-hoc networks without anypublic key infrastructure. Specifically, when device A chooses to establish connection to a previouslyunknown device B, device A needs know that it is actually communicating securely and authentically withdevice B and not with an attacker.

Approach

The approach is an extension and formalization of the .Resurrecting Duckling policy model. and providesbootstrapping secure wireless communication through pre-authentication over a location limited channel.The location-limited channel is different from the main wireless link and is chosen so that it has two specialsecurity properties: (i) demonstrative identification (identification based on physical context)
(ii) Authenticity, in the sense that is difficult for an attacker to transmit on the channel undetected. As an example,good candidates for a location-limited channel are actual physical contact, sound, infrared, etc, (in generalcommunication technologies with inherent physical limitations).This approach does not require secrecy, necessary in the .Resurrecting Duckling, making it impervious toeavesdropping. This is achieved through public key cryptography. The participants use the location-limited channel to exchange their public keys or the digests of the keys. This concludes the pre-authenticationphase and they can proceed to authenticate themselves over the wireless channel and establish a secret keyfor the session.

4. Existing Protocol: (LEACH)

Low-Energy Adaptive Clustering Hierarchy (LEACH), proposed by Heinzelman *et al*. is one of the pioneering clustering routing approaches for WSNs. The basic idea of LEACH has been an inspiration for many subsequent clustering routing protocols. The main objective of LEACH is to select sensor nodes as CHs by

rotation, so the high energy dissipation in communicating with the BS is spread to all sensor nodes in the network.

The operation of LEACH is broken up into lots of *rounds*, where each round is separated into two phases, the set-up phase and the steady-state phase. In the set-up phase the clusters are organized, while in the steady-state phase data is delivered to the BS. During the set-up phase, each node decides whether or not to become a CH for the current round. This decision is based on the suggested percentage of CHs for the network and the number of times the node has been a CH so far. This decision is made by the node choosing a random number between 0 and 1. The node becomes a CH for the current round if the number is less than the following threshold:

$$T(n)=\begin{cases}\dfrac{P}{1-P\left(r \bmod \dfrac{1}{P}\right)}, & \text{if } n \in G \\ 0, & \text{otherwise}\end{cases}$$

Where,P is the desired percentage of CHs, is the current round, and is the set of nodes that have not been elected CHs in the last 1/P rounds. When a node is elected CH successfully, it broadcasts an advertisement message to the other nodes. According to the received signal strength of the advertisement, other nodes decide to which cluster it will join for this round and send a membership message to its CH. In order to evenly distribute energy load among sensor nodes, CHs rotation is performed at each round by generating a new advertisement phase based on Equation (1). During the steady-state phase, the sensor nodes sense and transmit data to the CHs. The CHs compress data arriving from nodes that belong to the respective cluster, and send an aggregated or fused packet to the BS directly. Besides, LEACH uses a TDMA/code-division multiple access (CDMA) MAC to reduce inter-cluster and intra-cluster collisions. After a certain time, which is determined a priori, the network goes back into the set-up phase again and enters another round of CH election. Figure showed the basic topology of LEACH.

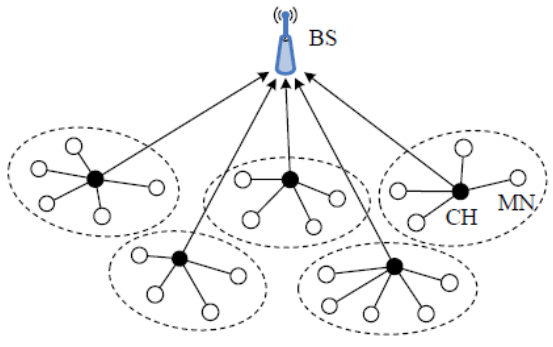

Fig: The Basic Topology of LEACH

The advantages of LEACH include the following:
(1) Any node that served as a CH in certain round cannot be selected as the CH again, so each node can equally share the load imposed upon CHs to some extent;
(2) Utilizing a TDMA schedule prevents CHs from unnecessary collisions; (3) Cluster members can open or close communication interfaces in compliance with their allocated time slots to avoid excessive energy dissipation. There exist a few disadvantages in LEACH as follows:
(1) It performs the single-hop inter-cluster, directly from CHs to the BS, routing method, which is not applicable to large-region networks. It is not always a realistic assumption for single-hop inter-cluster routing with long communication range. Besides, long-range communications directly from CHs to the BS can breed too much energy consumption; (2) Despite the fact that CHs rotation is performed at each round to achieve load balancing, LEACH cannot ensure real load balancing in the case of sensor nodes with different amounts of initial energy, because CHs are elected in terms of probabilities without energy considerations. Sensor nodes, with lower initial energy, that act as CHs for the same number of rounds as other sensor nodes, with higher initial energy, will die prematurely. This could bring about energy holes and coverage problems; (3) since CH election is performed in terms of probabilities, it is hard for the predetermined CHs to be uniformly distributed throughout the network. Thereby there exist the elected CHs that are concentrated in one part of the network and some nodes that have not any CHs in their vicinity; (4)The idea of dynamic clustering brings extra overhead. For instance, CH changes and advertisements may diminish the gain in energy consumption.

5. Taxonomy of Clustering Schemes:

In the literature, clustering attributes in WSNs, generally, can be roughly classified into cluster characteristics, cluster-head characteristics, clustering process and entire proceeding of the algorithm. In this section, we discuss a lot of detailed clustering attributes for WSNs, and propose a more comprehensive and fine-grained taxonomy compared to that of previous work. The categories included in the taxonomy are individually analyzed in the subsections that follow.

5.1 *Classification of Clustering Attributes in WSNs*

5.1.1 Cluster Characteristics

Variability of Cluster Count: Based on variability of cluster count, clustering schemes can be classified into two types: fixed and variable ones. In the former scheme, the set of cluster-head are predetermined and the number of clusters is fixed. However, the number of clusters is variable in the latter scheme, in which CHs are selected, randomly or based on some rules, from the deployed sensor nodes.

Uniformity of Cluster Sizes: In the light of uniformity of cluster sizes, clustering routing protocols in WSNs can be classified into two classes: even and uneven ones, respectively with the same size clusters and different size clusters in the network. In general, clustering with different sizes clusters is used to achieve more uniform energy consumption and avoid energy hole.
Intra-Cluster Routing: According to the methods of inter-cluster routing, clustering routing manners in WSNs also include two classes: single-hop intra-cluster routing methods and multiple-hop ones. For the manner of intra-cluster single-hop, all MNs in the cluster transmit data to the corresponding CH directly. Instead, data relaying is used when MNs communicate with the corresponding CH in the cluster.
Inter-Cluster Routing: Based on the manners of inter-cluster routing, clustering routing protocols in WSNs include two classes: single-hop inter-cluster routing manners and multiple-hop ones. For the manner of inter-

cluster single-hop, all CHs communicate with the BS directly. In contrast to it, data relaying is used by CHs in the routing scheme of inter-cluster multiple-hop.

5.1.2. Clustering Process

Control Manners: Based on control manners of clustering, clustering routing methods in WSNs can be grouped into centralized, distributed and hybrid ones. In centralized methods, a sink or CH requires global information of the network or the cluster to control the network or the cluster. In distributed approaches, a sensor node is able to become a CH or to join a formed cluster on its own initiative without global information of the network or the cluster. Hybrid schemes are composed of centralized and distributed approaches. In this environment, distributed approaches are used for coordination between CHs, and centralized manners are performed for CHs to build individual clusters.

Parameters for CH Election: Based on the parameters used for CH election, clustering approaches can be categorized as deterministic, adaptive, and random ones. In deterministic schemes, special inherent attributes of the sensor nodes are considered, such as the identifier (ID), number of neighbours they have. In adaptive manners, CHs are elected from the deployed sensor nodes with higher weights, which includes such as residual energy, communication cost, and *etc*. In random modes, mainly used in secure clustering algorithms, CHs are elected randomly without regard to any other metrics like residual energy, communication cost, *etc*.

Objectives: As discussed in the previous section, a few objectives have been pursued for cluster construction, such as data aggregation/fusion, load balancing, fault-tolerance, guarantee of connectivity, lifetime extension, quality of service, *etc*. Accordingly, clustering methods in WSNs can be classified into the above categories based on different objectives

6. Entire Proceeding of Algorithm:

Algorithm Stages: In general, a complete clustering routing algorithm comprises two basic stages, *i.e.*, cluster construction and data transmission, but the consideration degree of algorithms may differ in different stages. Based on algorithm stages of whole process of clustering algorithms, clustering routing protocols in WSNs can be classified into cluster construction based and data transmission based ones. In the former algorithm, cluster construction is mainly discussed, while data transmission is concerned less or performed by a relatively simple way.

Conclusion:

Considering the nodes remaining energy and their distances to the regional centre in a wireless sensor network makes the nodes with more remaining energy more possible to become cluster heads and these cluster heads will not appear at the edge of the region, so the cluster heads can cover larger area. Reselecting cluster head in the cluster makes the cluster head as close as possible to the centroid of the cluster area and its energy is greater than the average residual energy of nodes in the cluster, reducing the energy consumption for inside cluster communications.

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Chemical Synthesis and Characterization of Conducting Copolymers Polyaniline/Polythiophene

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Abstract

Oligomerization reactions of thiophene and aniline monomers and chemical copolymerization of these oligomers were investigated for synthesis of sample powder. The chemical oxidative polymerization of thiophene and aniline mixture polyaniline (PANI) and polythiophene (PTh) occurs when anhydrous $FeCl_3$ is used as oxidative agent. The different concentration of $FeCl_3$ was taken for polymerisation. It was observed that homopolymer and copolymer colloids of different compositions are formed, respectively, depending on the concentration of $FeCl_3$ used. The product was collected in form of powder sample. The characteristic was done through FTIR analysis. Also the mechanism of conductivity was discussed.

Keywords: Thiophene; Aniline; Copolymerization.

1. Introduction

The discovery of electronically conducting polymers offers a promise to open many new applications for polymeric materials. In particular, polythiophene, polyaniline have attracted attention. But all of these conducting polymers are insoluble and infusible which makes practical applications rather difficult [1]. Due to a great variety of applications in many fields, such as electrochromism, electro luminescence, sensors, and energy storage systems, conducting polymers have become the subjects of increased research interest. Although conducting polymers, such as polyaniline (PANI), polythiophene (PTh), polypyrrole (PPy) etc. have been studied extensively [2].

The conducting polymers based on heterocycles such as PANI, PTh and PPy have attracted considerable attention in recent years due to their high conductivity, interesting electrochemical properties and easy preparation. Several applications of these polymers are promising such as batteries, sensors, electrochromic devices, and electronic devices [3]. Electrochemically generated polythiophene and polyaniline films are advantageous for these applications as they show a good stability to oxygen and moisture in both undoped and doped forms. Conducting copolymers have high potential for modifying the physical properties of the homopolymers, providing materials with intermediate properties between two polymer systems and potentially soluble and processable conducting materials [4].

Attempts have been made to copolymerize different kinds of heterocyclic compounds such as aniline-thiophene improve the processability of the resulting conducting structure. However, only limited work was reported about aniline-thiophene copolymer due to the large difference between the oxidation potentials of two types of monomers. Bithiophene was used for copolymerization instead of thiophene. However thiophene is more conventional, could synthesize aniline and thiophene copolymers and composites in $Fecl_3$

and is used on electropreparation of conducting polymers [5].

Among the conducting polymers, special interest has been focused on PANI due to excellent thermal and environment stability combined with relatively high level of electrical conductivity. Nevertheless a few applications have been reported based on PANI because it exhibits poor mechanical properties. For the commercial use of conducting polymer composites, a complete understanding of their properties is necessary. Considerable efforts have been made over several decades to study the effect of filler on the dynamic electric and mechanical properties of the polymer [6].

In this present research work, PTh/PANI copolymerized and mixture conducting polymers were synthesized through chemical route by using different concentration of oxidant ($FeCl_3$) in the form of powder samples. The thick films of powder samples were prepared by screen-printing technique on a glass substrate.

2. Experimental

1) AR grade chemicals (Merck-India), monomer of thiophene and aniline, ferric chloride, were used in the present work. The thiophene and aniline monomers were used in 1:1 M. The solution of 1M $FeCl_3$ was prepared with organic solvent (methanol). After the rigorous stirring, drop-by-drop mixture of monomers was added in to the solution. In the polymerization reaction of mixture of monomers, it was observed that as soon as the monomer mixture was added to the solution, the color changed almost instantaneously and the solution became dark green/black. There was an increase in temperature of the solution during the start of reaction, which was an indication of exothermic reaction [7]. The reaction was carried out at room temperature. The reaction was stirred for 24 h with a magnetic stirrer, which gives rise to the formation of a black precipitate. The resulting black precipitate was vacuum filtered. The precipitate was washed with copious amounts of triply distilled water until the washings were clear. The copolymer and mixture of PTh/PANI so obtained was soft jet-black powder, dried in a desiccator's overnight and again dried in an oven at 40 °C. In this way, different samples copolymer PTh, PANI were prepared with different concentration (2-6M) of $FeCl_3$.

The IR spectra of powders were recorded on Shimadzu (Model-8201) FTIR in the KBr medium at room temperature in the region 3900–450 cm^{-1} at a 0.97 cm^{-1} resolution averaging 16 scans.

3. Results and Discussion

The FTIR spectrum (Fig. 1.) of the sample of 1:4 M concentrations was taken to confirm the copolymerization of aniline/thiophene monomer mixture. FTIR spectrum of PTh/PANI characteristics bands observed at 1576, 1457, 1366, 1134, 911 cm^{-1} is six principal absorption peaks were observed in FTIR spectrum. The peaks at 1590 cm^{-1} and 1508 cm^{-1} are assigned to C-C ring stretching vibrations. The peaks at 1292 cm^{-1} correspond to NH bending. The corresponding peaks for the polyaniline salt appear at 1593, 1505, 1292, 1246, and 845 cm^{-1} respectively. The peak at 2388 cm^{-1} could be attributed as due to N-H stretching mode and the 1685cm-1 bands to the N-H bending vibration [8]. The peak value 697cm^{-1} may be assigned to C-Cl stretching. The peak value 2923 cm^{-1} was assigned to C-H stretching vibration in PTh. The bands 1458, 1596 cm^{-1} may be assigned to C=C stretching in PTh. The C-H in-plane bending and C-S bending were observed at 1118 cm^{-1} and 747 cm^{-1} respectively [9]. The peaks value 1424, 1180, 907, 637 cm^{-1} may be assigned to the copolymer.

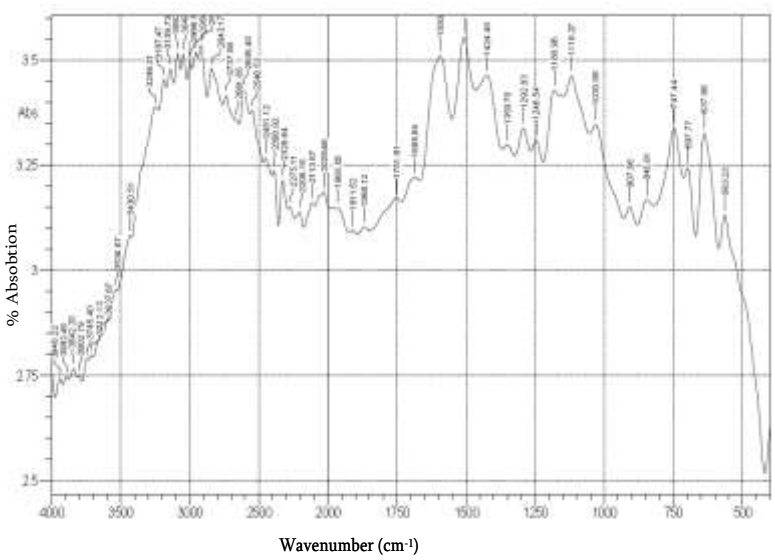

Fig.1. FTIR spectra of copolymer PTh/PANI with 4M concentration of $FeCl_3$.

Most polymers are insulator because their electrons are localized, that is, each of the electrons is attached to its own nucleus [10]. In organic solids, intramolecular interactions are mainly covalent, but intermolecular interactions are due to much weaker Vander Waals and London forces [5]. However, the conducting or semiconducting polymers have the conjugated double bonds. The double bond consists of a σ-bond and a π-bond. The electrons in the σ-bonds form the backbone of the chain, dominating the mechanical properties of the polymers. Due to the π-orbital overlap of neighbouring molecules of the conjugated structure, the π-electrons delocalize along the entire chain, which provides their semiconduting and conducting properties [5]. The σ-bonds form completely filled, low-lying energy bands have a much larger ionization potential than π-electrons (and a much large bandgap) and thus do not contribute in a major way to the electrical and optical properties. The π-bands, however, form an energy band in which each carbon atom contributes one electron, and thus the band should be half-filled because of the spin degeneracy [10].

In metals and conventional semiconductors, charge transport occurs in delocalized states. Such a model is no longer valid in low conductivity organic semiconductors, where a simple estimate shows that the mean free path of carriers would become lower than the mean atomic distance [11]. In these materials, the π-electrons are delocalized within a molecule and the carrier transport occurs through hopping of charges from one molecule to another.

Since the π-conjugated system in conducting polymers extends over the whole polymer chain, the conducting polymers can be regarded as one-dimensional polymer semiconductors [5]. In these materials, in addition to direct electron and hole excitations across the semiconductor band gap, the one-dimensional system may support a host of exotic carrier types like solitons (topological defects without charge, with spin ½), polarons (electrons and holes, self-trapped by carrier-lattice interactions) soliton-polarons (charged topological defects without spin, self-trapped by carrier-lattice interactions), bipolarons (two carriers with charge of the same sign, bound by lattice distortion), and polaron-excitons (two carriers with charge of opposite sign, bound by lattice distortion).

4. Conclusions

The chemical synthesis of PTh/PANI copolymer is a simple method. The copolymerization was confirmed from FTIR analysis. FTIR spectrum of PTh/PANI characteristics bands were observed at peaks 1576, 1457, 1366, 1134, 911 cm^{-1} and these showed six principal absorption peaks in FTIR spectrum. The peaks values 1424, 1180, 907, 637 cm^{-1} may be assigned to the copolymer. The conducting or semiconducting polymers have the conjugated double bonds. The double bond consists of a σ-bond and a π-bond. The electrons in the σ-bonds form the backbone of the chain, dominating the mechanical properties of the polymers. Due to the π-orbital overlap of

neighboring molecules of the conjugated structure, the π-electrons delocalize along the entire chain, which provides their semiconduting and conducting properties.

Acknowledgements

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Sign Language Glove with Text Synthesizer

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Abstract— ***Sign language is a language used by deaf and dumb people and it is a communication skill that uses gestures instead of sound to convey meaning simultaneously combining hand shapes, orientation and movement of the hands, arms or body and facial expressions to express fluidly a speaker's thoughts. Signs are used to communicate words and sentences. A gesture in a sign language is a particular movement of the hands with a specific shape made out of it. A sign language usually provides sign for whole words. It can also provide sign for letters to perform words that don't have corresponding sign in that sign language. In this paper Flex Sensor plays the major role, Flex sensors are sensors that change its resistance depending on the amount of bend on the sensor.***

This paper uses ATMEGA 16 controller to control all the processes and flex sensors will track the movement of fingers as well as entire palm. LCD will be used to display the user's gesture into text message.

Keywords— **Sign language, text synthesizer, flag sensors, ATMEGA 16 Microcontroller.**

[1] I.INTRODUCTION

Aims to extend the communication capabilities of those with hearing and speech disabilities after interacting with hearing and speech impaired athletes at their school, the quad squad team set out to develop a way for those who know sign language to communicate easily with those whose don't. Their solution includes a hardware component the gloves fitted with various sensors and a software component which translates the hand signals into text in real time.

The goal of paper is to recognize hand gestures using flex sensor, for the people, suffering in physiologically disability of speaking or in non communicative state. The dumb people are unable to speak but they can move their hand, finger using gesture movement. This gesture movement generate thesignal and these signal display on display board in the form of text message. Normal people cannot understand the sign language of dumb people but by reading text from display board they can understand the feelings of dumb people and they know what these people want. This paper provides easy communication of dumb people with normal person. For such type of people we are using flex sensor which gives the analog voltage of movement and the same voltage converted into digital information of the necessity of the persons to be displayed on the LCD screen attached at the receivers end for**respectivevoltage value captured by the flex sensors. The wireless communication is achieved by using RF cc2500 module.**

[2] II .BLOCK DIAGRAM

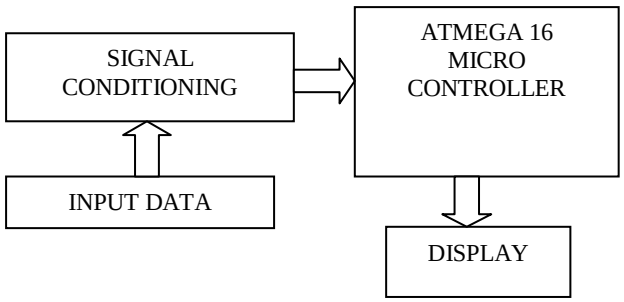

Fig. 1 Block Diagram

For the system to be implemented, requirement of following different modules were considered as the individual blocks for operation.

1. Input sensors for Hand Gesture Recognition.
2. Signal Conditioning for Data Compatibility to next Stage.
3. Microcontroller for Data Process and Action.
4. Display Device for Data and Menu Display.

In this paper, flex sensors will act as an input device, generating different voltages from its output pin. Now this input will be send to the microcontroller for processing by executing the code embedded in the microcontroller. Here Microcontroller will send a signal that the information will be display on LCD screen and the encoder will do encoding before sending to the receiver end via transmitter using CC2500.

In the receiver end a receiver module will be attached with the circuit which will detect the signal transmitted from the transmitter end and send to the decoder for decoding the signal into its original form, after decoding the signal, the signal send to microcontroller, after that the information will be display on LCD screen.

[3] III. WORKING OF MODULE

A. Transmitter Circuit

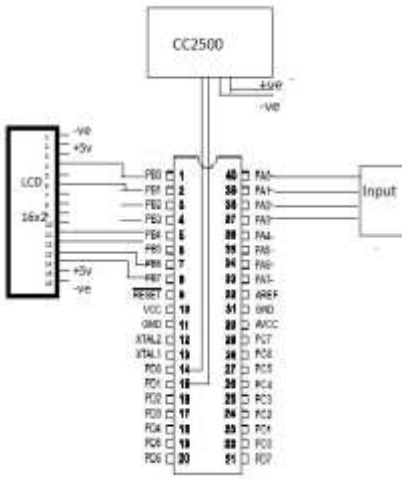

Fig.2 Circuit Diagram of Transmitter Section

Transmitter section works as a circuit used to transmit the signal to the receiver; this is achieved by using RF module. The flex sensors gives the output of gesture in the form of analog voltages, these voltages are fed to microcontroller for processing over that analog voltage, and these analog voltages can be converted into digital by using ADC, which are inbuilt in AVR microcontroller for processing the data. The output of microcontroller is fed to serial transmitter and LCD display for displaying the message where the signal is transmitted to receiver by using RF CC2500 transreceiver module

B. Receiver Circuit

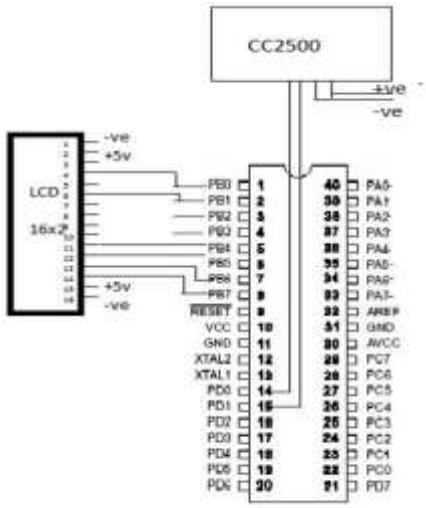

Fig.3 Circuit Diagram of Receiver Section

The function starts with the 8-pin receiver, which receive whatever signal coming from the RF CC2500 transreceiver module. The receiver fed this digital signal to microcontroller through serial transmission for processing and whatever information is transmitted by RF CC2500 transreceiver module will display on LCD at the receiver. In this circuit, buzzer is attached to CC2500 module which indicates that the signal is continuously coming from transmitter.

In both the circuit we are using soft wire antenna. There are DIP switches used in both section to match the frequency for the authenticate communication.

[4] IV. FLEX SENSOR

Fig. 4 Flex Sensor

Flex sensors are normally attached to the glove using needle and thread. They require a 5-volt input and output between 0 and 5 V, the resistivity vary with the sensor's degree of bend and the voltage output changes accordingly. The sensors connect to the device via three pin connector (ground, live, and output). The device can activate the sensors from sleep mode, enabling them to power down when not in use thus greatly reducing power consumption. The flex sensor pictured below changes resistance when bent. It only changes resistance in one direction. A flex sensor has a resistance of about 10 K-Ohms. As the flex sensor is bent, the resistance increases to 30- 40 kilo ohms at 90degrees. The sensor measures 0.25 inches wide, 4.5 inches long and 0.19 inches thick.

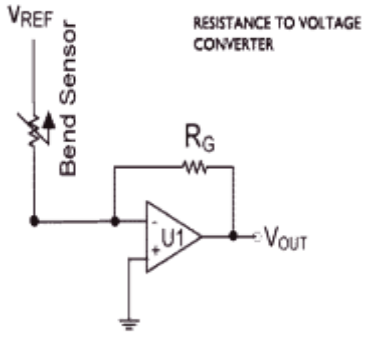

Fig. 5 Basic Flex sensor circuit

In this two or three sensors are connected serially and the output from the sensors is input to the analog to digital converter in the controller. The outputs from the flex sensors are input to LM258/LM358 op-amps and used a non-inverted style setup to amplify their voltage. Greater the degree of bending the lower the output voltage. The output voltage is determined based on the equation {Vin [R1 / (R1 + R2)]}, where R1 is the other input resistor to the non-inverting terminal. Using the voltage divider concept the output voltage is determined and it ranges from 1.35v to 2.5v.

Fig. 6 Gloves with Flex sensor

[5] V. MICROCONTROLLER ATMEGA 16

Fig.7 AT-Mega 16 Microcontroller

ATmega16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing) architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. Atmega32 can work on a maximum frequency of 16MHz. ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. The endurance cycle of flash memory and EEPROM is 10,000 and 100,000, respectively. ATmega32 consist of 4 input/output ports, which we can use to obtained output and to give input as per need. It consist of inbuilt ADC, USART, Analog Comparator, SPI, JTAG, hence there is no need toattached external devices.

In our paper we used ATmega16microcontroller, because it satisfies our all requirements, also its data processing speed is fast as compare to other microcontroller.

[6] VI. ADVANTAGES

1. Low cost system
2. Compact system
3. Flexible to users
4. It takes less power consumption to operate system.

[7] VII. APPLICATIONS

This approach can be used in various applications that are related to speech disabilities and that have many advantages and may vary on the basis of conditions, some of the applications are as follows

1. It was basically designed for the patient or dumb people those are in non-communicative state, with the help of movements they can communicate, sofollowing are the cases in which the patient can make use of our device
2. Physically challenged persons
3. Conveying information related operations
4. This approach has wider range of application in ICU, ICCU, and general ward of a hospital.

[8] VIII. FUTURE WORK

Changes are the prominent and key aspect in technology development. No developer can say that his / her proposed system is complete and no future changes are required. Every system has some life and need some development or improvisation as per current or future demands.

The completion of this prototype suggests that sensor gloves can be used for partial sign language recognition. More sensors can be employed to recognize full sign language. A handy and portable hardware device with built in translating system, speakers and group of body sensors along with the pair of data gloves can be manufactured so that a deaf and dumb person can communicate to any normal person anywhere. We can send message to anyone by using GSM module

[9] IX.LIMATATION

As none of existing system is 100% accurate it may have some limitations in it such as it works under the 100 meter of range

[10] X. CONCLUSION

Sign language is a useful tool to ease the communication between the deaf or dumb community and the normal people. Yet there is a communication barrier between these communities with normal people. This paper aims to lesser the communication gap between the deaf or dumb community and the normal world. This paper was meant to be a prototype to check the feasibility to recognize sign language using sensor

gloves. With this paper the deaf or dumb people can use the gloves to perform sign language and it will be converted in to speech so that normal people can easily understand. The main feature of this paper is the gesture recognizer is a standalone system, which is applicable in daily life.

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Distinguishing fade and dissolve from camera motion and object motion

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Abstract— **To reconstruct scenes from a given video, the key frames need to be extracted to represent the main content of each shot. In this paper, efficient key frame extraction techniques based mainly on transition detection are proposed. The main idea is to measure the similarity of content of two consecutive frames and based on that locate the fadesand dissolves. A new algorithm which combines the histogram similarity and edge change ratio is used to locate transition between shots. To enhance its effectiveness, an adaptive thresholding technique is applied. For fade and dissolve detection, an approach called edge-based contrast (EC) is proposed. The proposed algorithms were tested on a large variety of videos of different kinds and formats. The simulation results are tabulated. Future work may be focused on improvement in the values of recall and precision especially in presence of object and camera motion.**

Keywords— **key frames, fade, dissolve, transition.**

XXXI. INTRODUCTION

The high number and variety of available videos makes the search and retrieval of content a more and more difficult task. The search and visualization effort of videos implies a waste of time. All of these problems can be reduced or eliminated if proper indexing and retrieval methods could be applied. The demand for video summary work originates from a viewing time constraint as well as communication and storage limitations in security, military and entertainment applications. For example in an entertainment application, a user may want to browse summaries of his/her personal video taken during several trips; in a security application, a supervisor might want to see a 2 minutes summary of what happened at particular airport gate in the last 10 minutes.

In a military situation a soldier may need to communicate strategic informationwith a limited battery energy transmitter. Instead of sending all frames, better option is to transmit a subset of the frames with higher SNR quality. A video summary generator that can optimally select frames based on an optimality criterion is essential for these applications. The solution to this problem is typically based on a twostep approach: first identifying video shots from the video sequence and then selecting key frames according to some criterion from each video shot to generate video summary for the sequence.

To identify video shot boundaries and determine key frames by thresholding, a technique require two pass sequence. We assume that all the information is presented by the frames included in the summary and the temporal distortion is introduced by the missing frames. Gradual shot change detection is one of the most important issue in the field of video indexing, retrieval. Among the various types of gradual transitions, the fade and dissolve type the gradual transition is consider the most common one, but it is most difficult one to detect. In most of the existing fade and dissolve detection algorithms, the false/miss detection problem caused by motion is very serious. In this paper we present a novel fades and dissolve type transition detection algorithm that can correctly distinguish fades and dissolve from camera and object motion. This paper is based on the video processing using MATLAB software. A shorter version of the original video sequence called frame is desirable in a number of applications where storage, communication bandwidth and power are limited. While distinguishing the fade and dissolve from camera motion and object motion, we introduce a frame distortion metric and the temporal distortion which is then modelled as the frame distortion between the original and the reconstructed sequences.

XXXII. CLASSIFICATION OF TRANSITION EFFECT

Abrupt Transition

Abrupt transition is the instantaneous transitions which can be observe in two consecutive frames. Ex. Cut

Gradual Transition

Gradual transitions occurs slowly or gradually and can be observe along a range of frames

Ex. 1) Fade (Fade In and Fade Out)
2) Dissolve
3) Wipe

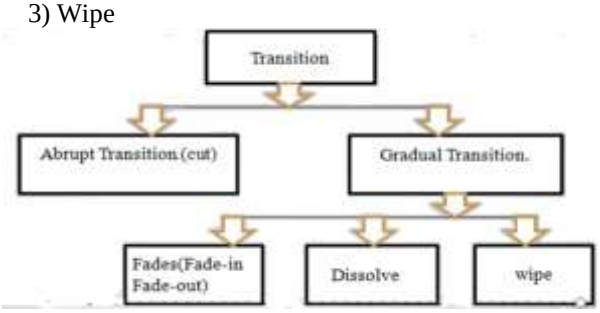

Fig. 1Different types of transition

FADE (FADE IN-FADE OUT)

A fade is a transition in which every pixel on the screen fades into single colour typically white or black.

Fig.2 Consecutive frames illustrating a fade-to-back transition

FADE IN

It is a gradual transition of a scene by increasing overall brightness and contrast until clear frame is obtained.

Fig. 3 Frame in fades in

FADE OUT

It is a gradual transition of a scene by diminishing overall brightness and contrast until all the contents are lost (Usually a black frame).

Fig. 4 Frame in fade out

DISSOLVE

Dissolve is a gradual super-imposition of two consecutive shots. The first shot fades out while the second shot simultaneously fades in.

Fig. 5 Dissolve transition

XXXIII. FALSE DETECTION AND MISDETECTIONS

In this section, we focus on the issues of false detection and misdetection of dissolves. First, it is possible that some consecutive frames may show no intensity change during longer dissolve sequences. To correctly detect longer dissolve sequences while maintaining correct detection in the original sequences, we dynamically sample video frames to ensure that most of the pixels will change in intensity. In contrast to the detection results obtained from the non-sampled video sequence, our algorithm worked better on the sampled video sequence. Second, we have even noted that the probability that the intensity of a pixel either increases or decreases between two consecutive frames is 1/2 in a non-dissolve sequence. Usually the following three measures are used to measure the quality of algorithm.

XXXIV. PERFORMANCE MEASURE

For the evaluation of detection algorithm, the precision and recall can be computed using following formulae.

$$\text{Recall(R)} = \frac{C}{C + M}$$

$$\text{Precision (P)} = \frac{C}{C + F}$$

Where C, M and F are the numbers of correct, miss and false detects respectively.F1 is a combined measure that results in high value ifand only if both precision and recall result in high values:

$$\text{F1measure} = \frac{2 * R * P}{P + R}$$

The recall and precision values are calculated by checking if the transition framewindows overlapped. Therefore only one frame overlap between the reference and detected transitions is required to produce good results. Additional performance indicators are needed to describe how accurately the system is able to spot the starting point and length of the transitions. This accuracy is measured using frameprecision and frame recall.

These values are calculated using only the reference transitions that were found and the corresponding detected transitions. That is the detected transitions and the reference transitions without a match are discarded when calculating these values.

XXXV. MOTION ANALYSIS

Motion analysis is a topic in computer vision, image processing and machine vision that studies applications in which two or more consecutive images from an image sequencesare processed to produce information based on the apparent motion in the images. In some applications, the camera is fixed relative to the scene and objects are moving around the scene. In some applications the scene is more or less fixed and the camera is moving and in some cases both the camera and the scene are moving. The motion analysisis used to detect motion i.e. find the points in the image where something is moving. The information that is produced is often related to a specific image in the sequence, corresponding to a specific time-point but then depends also

on the neighbouring images. This means that motion analysis can producetime-dependent information about motion. Applications of motion analysis can be found in rather diverse areas such as surveillance, medicine, film industry, and navigation of autonomous vehicles. A video camera can be seen as an approximation of a pinhole camerawhere each point in the image is illuminated by some point in the scene in front of the camera. Each visible point in the scene is projected along a straight line that passes through the camera aperture and intersects the image plane. This means that at a specific point in time, each point in the image refers to a specific point in the scene. This scene point has a position relative to the camera and if this relative position changes, it corresponds to a relative motion in 3D.

It is a relative motion since it does not matter if it is the scene point or the camera or both that are moving. It is only when there is a change in the relative position that the camera is able to detect that some motion has happened. By projecting the relative 3D motion of all visible points back into the image, the result is the motion field, describing the apparent motion of each image point in terms of a magnitude and direction of velocity of that point in the image plane. A consequence of this observation is that if the relative 3D motion of some scene pointsisalong their projection lines, the corresponding apparent motion is zero.

The camera measures the intensity of light at each image point. In practice, a digital camera measures this light field at discrete points i.e. pixels but given that the pixels are sufficiently dense, the pixel intensities can be used to represent most characteristics of the light field that falls onto the image plane. A common assumption of motion analysis is that the light reflected from the scene points does not vary over time. As a consequence, if an intensity I has been observed at some point in the image, the same intensity I will be observed at a position that is displaced relative to the first one as a consequence of the apparent motion. Another common assumption is that there is a fair amount of variation in the detected intensity over the pixels in an image. A outcome of this assumption is that if the scene point that corresponds to a certain pixel in the image has a relative 3D motion, then the pixel intensity is likely to change over time.

Motion analysis is also applicable in the manufacturing process. Using high speed video cameras and motion analysis software, one can monitor and analyseassembly lines and production machines to detect inefficiencies or malfunctions. Manufacturers of sports equipment such as baseball bats and hockey sticks also use high speed video analysis to study the impact of projectiles. Motion analysis can be divided into two types

1. Camera Motion Analysis

Camera Motion Analysis (CMA) aims at finding out the information of camera movements during shooting based on analysing video data and a parametric model that reflects the image coordinate correspondences between consecutive frames. Since camera motion information is important low level video feature, CMA is quite important for video retrieval and it is also quite useful for video content analysis.

When the camera moves fast, there will be significant displacement between consecutive frames, which may lead to inaccurate optical flow estimation.

An initial estimation of the camera motion model is computed by linear least square and in each of the following iterations, the motion vectors that have large bias from the model estimated in the previous iteration are removed before re-estimating the camera motion model. Video with these significant camera and object motion large view point changes and significant object motion between the consecutive frames brings the significant appearance variance. In thispaper we present a camera motion approach which work affectively for video indexing.

2. Object Motion Analysis

Object motion analysis includes moving object detection and tracking. Object detection in videos involves verifying the presence of an object in image sequences and possibly locating it precisely for recognition. To distinguish difference moving object, motion classifications is done by classifying object motion into several levels according to corresponding position, orientation and magnitude.

XXXVI. Result

Finally the result that we have observed manually and the result obtained from algorithm are tabulated and considered for the determination of recall and precision.

Manual Observations

CLIP1	FADE	0
	DISSOLVE	6
CLIP 2	FADE	2
	DISSPLVE	10
CLIP	FADE	12
	DISSOLVE	7
CLIP 4	FADE	10
	DISSOLVE	24
CLIP5	FADE	0
	DISSOLVE	8
CLIP 6	FADE	1
	DISSPLVE	7
CLIP 7	FADE	0
	DISSOLVE	15
CLIP 8	FADE	6
	DISSOLVE	20
CLIP 9	FADE	34
	DISSOLVE	0
CLIP 10	FADE	4
	DISSOLVE	30
TOTAL FADE	40	
TOTAL DISSOLVE	81	

Table 1 Manual Observation

Result from Algorithm

The set of videos that we have considered for manual observation is given as an input to the Matlab code and the result obtained from the programme is tabulated in the table 2.

CLIP1	FADE	0
	DISSOLVE	7
CLIP 2	FADE	2
	DISSPLVE	12
CLIP 3	FADE	12
	DISSOLVE	8
CLIP 4	FADE	10
	DISSOLVE	26
CLIP5	FADE	0
	DISSOLVE	7
CLIP 6	FADE	0
	DISSPLVE	7
CLIP 7	FADE	0
	DISSOLVE	18
CLIP 8	FADE	5
	DISSOLVE	22
CLIP 9	FADE	32
	DISSOLVE	1
CLIP 10	FADE	6
	DISSOLVE	28
TOTAL FADE	67	
TOTAL DISSOLVE	136	

Table 2 Result from Algorithm

XXXVII. FUTURE EXPANSION AND CONCLUSIONS

In this paper, we have proposed an efficient method for detecting gradual transitions. Also shot boundary detection method using colour histogram difference as the main feature of analysis in front of camera and moving objects.In this paper, an effective camera and object motion analysis approach for video analysis is considered. The experimental results show that our method especially works effectively on shots from action movies which contain more significant camera motions and object motions.

In this paper, we have proposed an efficient method for detecting dissolve-type gradual transitions. Recall values obtained by this algorithm are in the [77% - 85%] range while precision values are in the [66% - 82%] range. The main contributions of this paper are the threshold of proposed algorithm can be determined theoretically.A binomial distribution model is used to distinguish real dissolves from motion. As most general motions can be filtered out by using a very low threshold, a real dissolve effect can be easily detected.

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"Cell Breathing Techniques for Load Balancing in Wireless LANs"

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ABSTRACT

Maximizing network throughput while providing fairness is one of the key challenges in wireless LANs (WLANs). This goal is typically achieved when the load of access points (APs) is balanced. Recent studies on operational WLANs, however, have shown that AP load is often substantially uneven. To alleviate such imbalance of load, several load balancing schemes have been proposed. These schemes commonly require proprietary software or hardware at the user side for controlling the user-AP association. In this paper we present a new load balancing technique by controlling the size of WLAN cells (i.e., AP's coverage range), which is conceptually similar to cell breathing in cellular networks. The proposed scheme does not require any modification to the users neither the IEEE 802.11 standard. It only requires the ability of dynamically changing the transmission power of the AP beacon messages. We develop a set of polynomial time algorithms that find the optimal beacon power settings which minimize the load of the most congested AP. We also consider the problem of network-wide min-max load balancing. Simulation results show that the performance of the proposed method is comparable with or superior to the best existing association-based method.

INTRODUCTION

Recent studies on operational IEEE 802.11 wireless LANs WLANs) have shown that traffic load is often unevenly distributed among the access points (APs). In WLANs, by default, a user scans all available channels and associates itself with an AP that has the strongest received signal strength indicator (RSSI), while being oblivious to the load of APs. As users are, typically, not evenly distributed, some APs tend to suffer from heavy load, while their adjacent APs may carry only light load. Such load imbalance among APs is undesirable as it hampers the network from fully utilizing its capacity and providing fair services to users. In this paper, we present a novel load balancing scheme that reduces the load of congested APs by forcing the users near the boundaries of congested cells to move to neighboring less congested cells. We achieve this via cell size dimensioning by controlling the transmission power of the AP beacon messages. In this paper, a WLAN cell is defined as a region in which the AP beacon signal has the strongest RSSI. Our approach is conceptually similar to cell breathing in cellular networks. We present an optimal algorithm that finds deterministic min-max load balancing solutions. Informally, a WLAN is called min-max load balanced, if it is impossible to reduce the load of any AP without increasing the load of other APs with equal or higher load. Our approach is practical since it does not require either user assistance or standard modification.

The project entitled as **"**Cell Breathing Techniques for Load Balancing in Wireless LANs" developed using .NET using C#.

Modules display as follows.

- Client Model
- Server Model
- Network Model
- Cell Breathing Approach
- Congestion Load Minimization
- Algorithmic challenges

MODULE DESCRIPTION

➢ CLIENT MODEL

A **client** is an application or system that accesses a remote service on another computer system, known as a server, by way of a network. The term was first applied to devices that were not capable of running their own stand-alone programs, but could interact with remote computers via a network. These dumb terminals were clients of the time-sharingmainframe computer.

➢ SERVER MODEL

In computing, a **server** is any combination of hardware or software designed to provide services to clients. When used alone, the term typically refers to a computer which may be running a server operating system, but is commonly used to refer to any software or dedicated hardware capable of providing services.

➢ NETWORK MODEL

Generally, the channel quality is time-varying. For the ser-AP association decision, a user performs multiple samplings of the channel quality, and only the signal attenuation that results from long-term channel condition changes are utilized Our load model can accommodate various additive load definitions such as the number of users associated with an AP. It can also deal with the multiplicative user load contributions.

- **CELL BREATHING APPROACH**

We reduce the load of congested APs by reducing the size of the corresponding cells. Such cell dimensioning can be obtained, for instance, by reducing the transmission power of the congested APs. This forces users near the congested cells' boundaries to shift to adjacent (lesscongested) APs. The separation between the transmission power of the data traffic and that of the AP beacon messages. On one hand, the transmission bit rate between a user and its associated AP is determined by the quality of the data traffic channel. Transmitting the data traffic with maximal power3 maximizes the AP-user SNR and the bit rate. On the other hand, each user determines its association by performing a scanning operation, in which it evaluates the quality of the beacon messages of the APs in its vicinity.

- **CONGESTION LOAD MINIMIZATION**

The algorithms presented in Section 4 minimize the load of the congested AP, but they do not necessarily balance the load of the non congested APs, as demonstrated in Examples 4 and 5. In this section, we consider min-max load balancing approach that not only minimizes the network congestion load but also balances the load of the non congested APs. As mentioned earlier, the proposed approach can be used for obtaining various max-min fairness objectives by associating each users with appropriate load contributions. Unfortunately, min-max load balancing is NP-hard problem and it is hard to find even an approximated solution. In this paper, we solve a variant of the min-max problem, termed min-max priority-load balancing problem, whose optimal solution can be found in polynomial time.

- **ALGORITHMIC CHALLENGES**

A greedy algorithm that reduces the power level of the congested APs until any of the congested APs reaches to the minimal power level. This will shift users from congested APs to their neighbors, and the set of congested APs and their load may change during the execution of the algorithm. A complete knowledge model is feasible when all users collect the RSSI information from all of the nearby APs. Such a feature is suggested, for instance, in the IEEE 802.11- k proposal. Unfortunately, this feature is currently not available in most existing WLANs. We use this model as a building block for the limited knowledge solution.

FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

1)

2) TECHNICAL FISIBILITY

3) This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

SYSTEM REQUIREMENT SPECIFICATION

EXISTING SYSTEM

Cell breathing has been studied mostly in the context of CDMA cellular networks. The coverage and capacity of a CDMA cell are inversely related with each other .The increase of the number of active users in a cell causes the increase of the total interference sensed at the base station. Therefore, in congested cells, users need to transmit with higher power to maintain a certain signal-to-interference ratio at the receiving base station. As the users in a congested cell increase their transmission power, they also increase their interference to the neighboring cells since all cells use the same frequency in CDMA networks. As a result, the overall network capacity may decrease. Furthermore, since the maximal transmission power of the users is bounded, the users who are far from the base station may experience poor services. To overcome these problems, the cell breathing approach was proposed. In essence, they reduce the size of congested cells.

PROPOSED SYSTEM

we address the problem of minimizing the load of the congested APs. Let us call the AP with the maximal load as congested AP and its load as congestion load. We designed two polynomial time algorithms that find optimal solutions, one for the complete knowledge model and the other for the limited knowledge model. These results are intriguing, because similar load balancing problems, are known to be strong NP-hard. It is particularly interesting that a polynomial time optimal algorithm exists for the limited knowledge model. Second, we address the problem of min-max load balancing. This is a strong NP-hard problem. In , it is

proved that there exists no algorithm that guarantees any coordinate wise approximation ratio, and the approximation ratio of any prefix-sum approximation algorithm is at least nlogn , where n is the number of APs. In this paper, we solve a variant of this min-max problem, termed min-max priority load balancing, whose optimal solution can be calculated in polynomial time for both knowledge models. Here, the AP load is defined as an ordered pair of the aggregated load contributions of its associated users and a unique AP priority.

REQUIREMENTS SPECIFICATION

1. HARDWARE REQUIREMENTS

- System : Pentium IV 2.4 GHz
- Hard disk: 40 GB
- Floppy drive : 1.44 MB
- Monitor : 15 VGA colour
- Mouse : Logitech.
- RAM : 256 MB

2. SOFTWARE REQUIREMENTS

- Operating system :- Windows XP / 7
- Front End : - Visual Studio 2010
- Coding Language :- Visual C# .Net
- Back-End : - Sql Server 2008.

SYSTEM DESIGN

ANALYSIS AND DESIGN

Software design sits at the technical kernel of the software engineering process and is applied regardless of the development paradigm and area of application. Design is the first step in the development phase for any engineered product or system. The designer's goal is to produce a model or representation of an entity that will later be built. Beginning, once system requirement have been specified and analyzed, system design is the first of the three technical activities -design, code and test that is required to build and verify software.

SYSTEM IMPLEMENTATION

The importance can be stated with a single word "Quality". Design is the place where quality is fostered in software development. Design provides us with representations of software that can assess for quality. Design is the only way that we can accurately translate a customer's view into a finished software product or system. Software design serves as a foundation for all the software engineering steps that follow. Without a strong design we risk building an unstable system – one that will be difficult to test, one whose quality cannot be assessed until the last stage.

During design, progressive refinement of data structure, program structure, and procedural details are developed reviewed and documented. System design can be viewed from either technical or project management perspective. From the technical point of view, design is comprised of four activities – architectural design, data structure design, interface design and procedural design.

DATA FLOW DIAGRAM

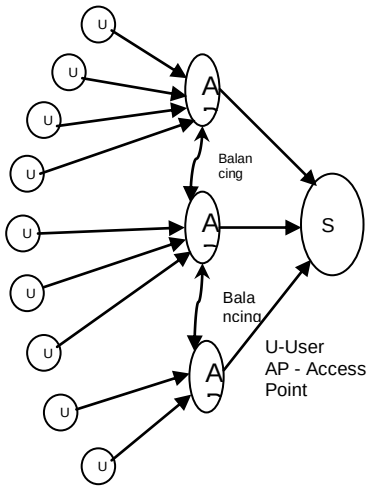

Fig. Data flow diagram

STATE DIAGRAM

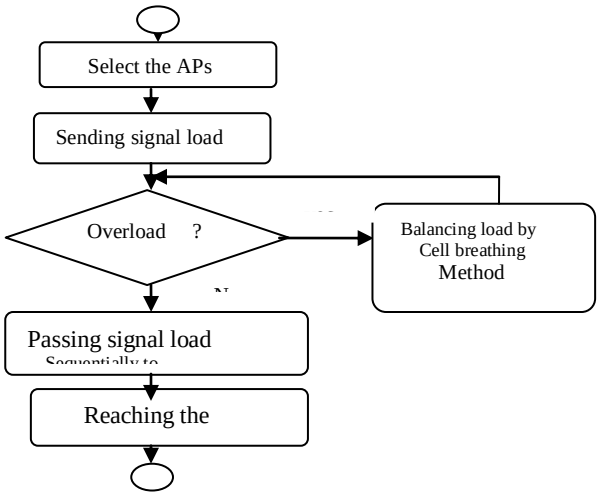

Fig. State diagram

SYSTEM IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective. The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

Implementation is the process of converting a new system design into operation. It is the phase that focuses on user training, site preparation and file conversion for installing a candidate system. The important factor that should be considered here is that the conversion should not disrupt the functioning of the organization.

TECHNOLOGY DETAILS

Visual Studio

A programming language and environment developed by Microsoft. Based on the BASIC language, Visual Studio was one of the first products to provide a graphical programming environment and a paint metaphor for developing user interfaces. Instead of worrying about syntax details, the Visual Studio programmer can add a substantial amount of code simply by dragging and dropping controls, such as buttons and dialog boxes, and then defining their appearance and behavior. Although not a true object-oriented programming language in the strictest sense, Visual Studio nevertheless has an object-oriented philosophy. It is sometimes called an *event-driven* language because each object can react to different events such as a mouse click.

SYSTEM TESTING AND MAINTENANCE

Testing is vital to the success of the system. System testing makes a logical assumption that if all parts of the system are correct, the goal will be successfully achieved. In the testing process we test the actual system in an organization and gather errors from the new system operates in full efficiency as stated. System testing is the stage of implementation, which is aimed to ensuring that the system works accurately and efficiently.

In the testing process we test the actual system in an organization and gather errors from the new system and take initiatives to correct the same. All the front-end and back-end connectivity are tested to be sure that the new system operates in full efficiency as stated. System testing is the stage of implementation, which is aimed at ensuring that the system works accurately and efficiently. The main objective of testing is to uncover errors from the system. For the uncovering process we have to give proper input data to the system. So we should have more conscious to give input data. It is important to give correct inputs to efficient testing. Testing is done for each module. After testing all the modules, the modules are integrated and testing of the final system is done with the test data, specially designed to show that the system will operate successfully in all its aspects conditions. Thus the system testing is a confirmation that all is correct and an opportunity to show the user that the system works. Inadequate testing or non-testing leads to errors that may appear few months later. This will create two problems Time delay between the cause and appearance of the problem. The effect of the system errors on files and records within the system.

The purpose of the system testing is to consider all the likely variations to which it will be suggested and push the system to its limits. The testing process focuses on logical intervals of the software ensuring that all the statements have been tested and on the function intervals (i.e.,) conducting tests to uncover errors and ensure that defined inputs will produce actual results that agree with the required results. Testing has to be done using the two common steps Unit testing and Integration testing. In the project system testing is made as follows:

The procedure level testing is made first. By giving improper inputs, the errors occurred are noted and eliminated. This is the final step in system life cycle. Here we implement the tested error-free system into real-life environment and make necessary changes, which runs in an online fashion. Here system maintenance is done every months or year based on company policies, and is checked for errors like runtime errors, long run errors and other maintenances like table verification and reports.

UNIT TESTING

Unit testing verification efforts on the smallest unit of software design, module. This is known as "Module Testing". The modules are tested separately. This testing is carried out during programming stage itself. In these testing steps, each module is found to be working satisfactorily as regard to the expected output from the module.

INTEGRATION TESTING

Integration testing is a systematic technique for constructing tests to uncover error associated within the interface. In the project, all the modules are combined and then the entire programmer is tested as a whole. In the integration-testing step, all the error uncovered is corrected for the next testing steps.

APPLICATION

- In mobile networks nowadays using cell breathing technology for roaming purpose to avoid overload in home network
- Cell breathing method which finds deterministic global optimal solutions for providing fairness to get the digital voice clarity.

FUTURE ENHANCE

- In future we can introduce this cell breathing technology in internet connection mainly in WIFI technology. Already in this project we proved that by using this method we can avoid the network traffic or overload on APs.
- If we apply this technology on WIFI connection means, we can increase the speed of the internet and get connection continuously without any interrupt. Definitely in future cell breathing method would occupy the major part of the communication field.

CONCLUSION

We presented a novel scheme for optimal load balancing in IEEE 802.11 WLANs. We provided rigorous analysis of the

problem and presented two algorithms that find Deterministic optimal solutions. The first algorithm minimizes the load of the congested AP(s) in the network, and the second algorithm produces an optimal min-max (Priority) load balanced solution. These optimal solutions are obtained only with the minimal information which is readily available without any special assistance from the 748 IEEE TRANSACTIONS ON MOBILE COMPUTING, VOL.8 In this paper, we assume only the control on the transmission power of the AP beacon messages. The simulations show that even a small number of power levels, e.g., between 5 and 10, is enough to achieve near optimal results.

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A Review on Different Wireless Broadband Access Techniques

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***Abstract*— Gi-Fi will help to push wireless communications to faster drive. For many years cables ruled the world. Optical fibers played a dominant role for its higher bit rates and faster transmission. But the installation of cables caused a greater difficulty and thus led to wireless access. The foremost of this is Bluetooth which can cover 10m. Wi-Fi followed it having coverage area of 100m. No doubt, introduction of Wi-Fi wireless networks has proved a revolutionary solution to "last mile" problem. However, the standard's original limitations for data exchange rate and range, number of channels, high cost of the infrastructure have not yet made it possible for Wi-Fi to become a total threat to cellular networks on the one hand, and hard-wire networks, on the other. Gi-Fi or Gigabit Wireless is the world's first transceiver integrated on a single chip that operates at 60GHz on the CMOS process. It will allow wireless transfer of audio and video data up to 5gigabits per second, ten times the current maximum wireless transfer rate, at one-tenth of the cost, usually within a range of 10 meters. It utilizes a 5mm square chip and a 1mm wide antenna burning less than 2 mW of power to transmit data wirelessly over short distances, much like Bluetooth.**

The development will enable the truly wireless office and home of the future. As the integrated transceiver is extremely small, it can be embedded into devices. The breakthrough will mean the networking of office and home equipment without wires will finally become a reality. In this we present a low cost, low power and high broadband chip, which will be vital in enabling the digital economy of the future.

Keywords-Wireless Technology, Zigbee, Bluetooth, Wi-Fi, Wimax,Gi-Fi.

I. INTRODUCTION

Wireless technology improvement has become follower in today's modern life. One of the greatest improvements made on wireless technology field was inventing a new wireless home. Short-range wireless technologies have long been seen as a solution, however most cannot deliver the multi-gigabit speeds needed to transmit high-quality video signals. Those can have been prohibitively expensive. NICTA's Gi-Fi research team has overcome both of these challenges.

This is a lot faster than any current Wi-Fi speeds. The world's first Gi-Fi wireless network chip developed at Australia's peak federal technology incubator has entered its commercialization phase. The NICTA (National ICT Australia Limited) Gi-Fi research team has succeed in taking complex 60GHz transmission technology and shrinking it to the point where it can be built on a single silicon chip. The Gi-Fi chip is good news for personal area networking because there is no internet infrastructure available to cop it with. It can have a span of 10 meters. Gi-Fi or Gigabit Wireless is the world's first transceiver integrated on a single chip that operates at 60GHz.Gi-Fi is a wireless transmission system which is ten times faster than Wi-Fi. It will allow wireless transfer of audio and video data up to 5 gigabits per second, low power consumption, usually within a range of 10 meters. This technology providing low-cost, high broadband access, with very high speed large files exchange within seconds.Multi-gigabit wireless technology that removes the need for cables between consumer electronic devices. The best part about this new technology Gi-Fi is its cost effectiveness and power consumption; it consumes less than 2 mW of power for its operation.

II. LITERATURE REVIEW

Wireless means transmitting signals using radio waves as the medium instead of wires. There are different wireless technologies are introduced ZigBee is one of them broadly categorized as a low rate WPAN, and its closest technology is Bluetooth. A good bit of energy has been spent in analyzing whether ZigBee and Bluetooth are complementary or competing technologies, but after a quick look at the two, it can be seen that they fall a lot farther down the complementary side of the spectrum. They are two different technologies with very different areas of application and different means of designing for those applications. While ZigBee is focused on control and automation, Bluetooth is focused on connectivity between laptops and the like, as well as more general cable replacement. ZigBee uses low data rate, low power consumption, and works with small packet devices; Bluetooth uses a higher data rate, higher power consumption, and works with large packet devices[1].ZigBee networks can support a larger number of devices and a longer range between devices than Bluetooth. Because of these differences, the technologies are not only geared toward

different applications, they don't have the capability to extend out to other applications [2].
Bluetooth must rely on fairly frequent battery recharging, while the whole goal of ZigBee is for a user to be able to put a couple of batteries in the devices and forget about them for months to years. In timing critical applications, ZigBee is designed to respond quickly, while Bluetooth takes much longer and could be detrimental to the application. Thus, a user could easily use both technologies as a wireless solution in a PAN to suit all types of applications within that network [6].

After that for wireless internet access we have used WI-FI technology.Wi-Fi stands for "wireless fidelity". Wi-Fi technology builds on IEEE 802.11 standards [7]. Wi-Fi allows the deployment of local area networks (LANs) without wires for client devices, typically reducing the costs of network deployment and expansion. Spaces where cables cannot be run, such as outdoor areas and historical buildings, can host wireless LANs. It is based on IEEE802.11 established in 1990 [7]. But Wi-Fi has some limitations like Wi-Fi technology is still using local area network (LAN) for the predictable future with some limited speed of data transmission, to overcome this problem WIMAX is work, which provides faster speed but has coverage up to 50 km which interconnects the LAN & MAN also compared with WI-FI range is limited [8].
In 1998, the IEEE (The Institute of Electrical and Electronics Engineers) began standards project to specify a point-to-multipoint broadband wireless access system suitable for the delivery of data, voice, and video services to fixed customer sites. The initial standard, designated IEEE 802.16 was developed for the higher microwave bands (> 10 GHz) where line-of-sight between system antennas is required for reliable service [9].
In 2001 wimax is introduced, IEEE 802.16 wimax has High data rate, high power and having Point To Point, Line Of Sight configuration which is known as fixed wimax [9].
In 2003 the new version of wimax is presented [9]. IEEE 802.16a enhances the medium access control layer so that it can supportmultiple physical layer specification which is having Medium data rate, Point To Point and also Point to Multipoint, fixed. In this version security issues are improved [9].

Wimax allows data rate up to 70 Mbps to overcome this problem again new technology is introduced that is Gi-Fi [10].
Gi-Fi or Gigabit Wireless is the world's first transceiver integrated on a single chip that operates at 60GHz on the CMOS process. It will allow wireless transfer of audio and video data up to 5gigabits per second, ten times the current maximum wireless transfer rate, at one-tenth of the cost, usually within a range of 10 meters. It utilizes a 5mm square chip and a 1mm wide antenna burning less than 2 mW of power to transmit data wirelessly over short distances, much like Bluetooth [12].

III. ZIGBEE TECHNOLOGY

It would be common to find as many as a hundred of ZigBee chips around the house in the form of light switches, fire and smoke detectors, thermostats, kitchen appliances, video and audio remote controls, security systems, etc . Recently, ZigBee has become one of the most promising technologies for home networks. ZigBee is a specification for a suite of networking, security and application software layers using small, low-power, low data rate communication technology based on IEEE 802.15.4 standard for personal area networks.
There have been various studies on ZigBee based home networks. To realize remote home automation based on ZigBee, implementation issues of home gateway and device nodes are proposed. It presents hardware platform consideration and software implementation for each of them. Similarly, hardware design issues are discussed for various home devices such as wireless communications transceiver modules base, USB expansion base and control switches for electrical appliances in a room.
ZigBee is designed for wireless controls and sensors. It could be built into just about anything you have around your home or office, including lights, switches, doors and appliances. These devices can then interact without wires, and you can control them from a remote control or even your mobile phone. It allows wireless two-way communications between lights and switches, thermostats and furnaces, hotel-room air conditioners the front desk, and central command posts. It travels across greater distances and handles many sensors that can be linked to perform different tasks. ZigBee has been designed to transmit slowly. It has a data rate of 250kbps (kilobits per second), pitiful compared with Wi-Fi, which is hitting throughput 20Mbps or more. But because ZigBee transmits slowly, it doesn't need much power, so batteries will last up to 10 years. Because ZigBee consumes very little power, a sensorto five years on a single double-A battery. Therefore, the phone will be able to act as a remote control for all the ZigBee devices it encounters.
In these environments, the transceiver wakes up, listens for an open channel and transmits small packets of data at lower data rates. Then it shuts down until the next event is indicated. The sequencing, fast power on latency, lower data rates and small data packets allow an 802.15.4 transceiver to select time increments where the data transmission will be most effective. As mentioned previously, for sensing and control subsystems, data transmission range and power requirements are best supported with ZigBee technology solutions. The typical range defined by the ZigBee Alliance specification is 10–75m; however, many solutions offer line-of-sight ranges well beyond this. It is important to review the number and types of transceiver channels available in relation to the planned design.

The transmission range varies with the environment all from 10 to 75 meters. Longer range can be obtained with smarter

antennas; smart network designs or one can add power amplifiers to the transceiver. The analog portion of the receiver converts the desired signal from RF to the digital baseband. Dispreading of signal is done in the digital portion of the receiver. The digital part of the transmitter does the spreading signal, whereas the analog part of the transmitter does the modulation and conversion to RF. The choice of the receiver architecture is mainly a compromise of functional performance, power consumption and requirement of external components. Both analog receiver and transmitter architectures are direct-conversion "DCR" .

IV. BLUETOOTH TECHNOLOGY

Bluetooth is an open wireless technology standard for exchanging data over short distances (using short wavelength radio transmissions) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security. Created by telecoms vendor Ericsson in 1994, it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization. Today Bluetooth is managed by the Bluetooth Special Interest Group. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each) in the range 2402-2480 MHz's This is in the globally unlicensed Industrial, Scientific and Medical 2.4 GHz short-range radio frequency band.

Fig. Bluetooth Devices

Market Name	Bluetooth	ZigBee
1. Application Focus	Cable Replacement	Monitoring & Control
2. Node	7	64,000
3. Battery life (Day)	1-7	100-1000
4. Transmission Range(Meters)	1-10	10-100
5. Success Metrices	Reliability, power	Cost convinces

Table: Comparison of Bluetooth & Zigbee

V.WI-FI TECHNOLOGY

Wi-Fi stands for "wireless fidelity". Wi-Fi technology builds on IEEE 802.11 standards. Wi-Fi allows the deployment of local area networks (LANs) without wires for client devices, typically reducing the costs of network deployment and expansion. Spaces where cables cannot be run, such as outdoor areas and historical buildings, can host wireless LANs. As of 2010 manufacturers are building wireless network adapters into most laptops. The price of chipsets for Wi-Fi continues to drop, making it an economical networking option included in even more devices. Wi-Fi has become widespread in corporate infrastructures. Different competitive brands of access points and client network-interfaces can inter-operate at a basic level of service. Products designated as "Wi-Fi Certified" by the Wi-Fi Alliance are backwards compatible. "Wi-Fi" designates a globally operative set of standards: unlike mobile phones, any standard Wi-Fi device will work anywhere in the world.

Wireless LANs may not be desirable for a number of reasons. Most of these have to do with the inherent limitations of the technology.

1. Security:
To combat this consideration, wireless networks may choose to utilize some of the various encryption technologies available. Some of the more commonly utilized encryption methods, however, are known to have weaknesses that a dedicated adversary can compromise.

2. Reliability:
Like any radio frequency transmission, wireless networking signals are subject to a wide variety of interference, as well as complex propagation effects that are beyond the control of the network administrator.

3. Speed:
The speed on most wireless networks (typically 1-54 Mbps) is far slower than even the slowest common wired networks (100Mbps up to several Gbps). However, in specialized environments, the throughput of a wired network might be necessary.

VI. WIMAX TECHNOLOGY

Wimax stands for Worldwide Interoperability for Microwave Access. Wimax technology is a telecommunications technology that offers transmission of wireless data via a number of transmission methods; such as portable or fully mobile internet access via point to multipoint's links. The Wimax technology offers around 70 Mega Bits per second without any need for the cable infrastructure**.** Wimax technology is based on Standard that is IEEE 802.16, it usually also called as Broadband Wireless Access. Wimax technology is actually based on the standards that making the possibility to delivery last mile broadband access as a substitute to conventional cable and DSL lines.

Wimax would operate similar to Wi-Fi but at higher speeds, over greater distances and for a greater number of users. WiMAX has the ability to provide service even in areas that are difficult for wired infrastructure to reach and the ability to overcome the physical limitations of traditional wired infrastructure. WiMAX could potentially be deployed in a variety of spectrum bands: 2.3GHz, 2.5GHz, 3.5GHz, and 5.8GHz.

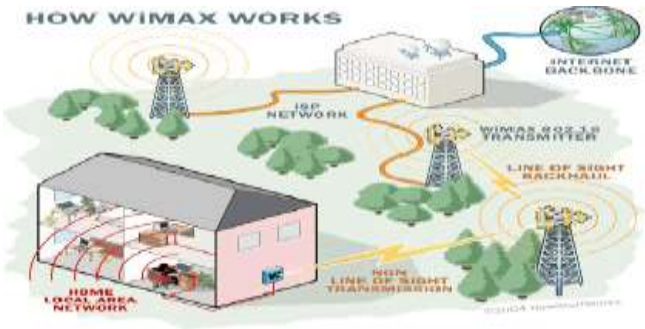

Fig. WIMAX Network

VII. TYPES OF WIMAX

The WiMAX family of standards concentrates on two types of usage models a fixed usage model and a mobile usage model. The basic element that differentiates these systems is the ground speed at which the systems are designed to manage. Based on mobility, wireless access systems are designed to operate on the move without any disruption of service; wireless access can be divided into three classes; stationary, pedestrian and vehicular.

1.Fixed Wimax:
Service and consumer usage of WiMAX for fixed access is expected to reflect that of fixed wire-line service, with many of the standards-based requirements being confined to the air interface. Because communications takes place via wireless links from Customer Premise Equipment (CPE) to a remote Non Line-of-sight (NLOS) base station, requirements for link security are greater than those needed for a wireless service. The security mechanisms within the IEEE 802.16 standards are sufficient for fixed access service. Another challenge for the fixed access air interface is the need to set up high performance radio links capable of data rates comparable to wired broadband service, using equipment that can be self installed indoors by users, as is the case for Digital Subscriber Line (DSL) and cable modems. IEEE 802.16 standards provide advanced physical (PHY) layer techniques to achieve link margins capable of supporting high throughput in NLOS environments. The 802.16a extension, refined in January 2003, uses a lower frequency of 2 to 11 GHz, enabling NLOS connections.

2. Mobile Wimax:
The latest 802.16e task group is capitalizing on the new capabilities this provides by working on developing a specification to enable mobile WiMAX clients. These clients will be able to hand off between WiMAX base stations, enabling users to roam between service areas.

	WI-FI	WIMAX
RANGE	Up to 300 feet (About 100 meter)	Up to 30 Miles (About 50 KM)
COVERAGE	Optimized for indoor performance, Short Range.	Outdoor Non Line of Sight(NLOS) Performance; Support For Advanced Antenna Technologies.
SCALABILITY	Supporting one to dozen users, one CPE per user. Fixed 20MHz Channel Width.	Supporting One to Hundreds Pieces Of CPE; Unlimited Subscriber Within Each CPE. Flexible 1.5 to 20MHz.
BIT RATE	2.7 Bps/Hz	5Bps/Hz
SPEED	54 Mbps in 20MHz Channel.	74 Mbps in 20MHz Channel.
QoS (Quality Of Services)	No QoS Supports.	Support QoS which enables services for voice & videos.
SECURITY MECHANISM	Wired Equivalent Privacy Authentication, Pre-shared key	Extensible Authentication Protocol Based Authentication; Privacy Key Management.

Table:Comparison of Wi-fi & Wimax.

VIII. GI-FI TECHNOLOGY

When telling people to migrate from Wi-Fi or Wi-Max to Gi-Fi, the question you usually hear is why. There are actually a few good reasons to move to the new technology.
The process of Gi-Fi would use a chip that transmits at an extremely high 60GHz frequency versus the 5GHz used for the fastest forms of Wi-Fi.
Mixing and signal filtering used in Gi-Fi technology would keep the signal strong versus the longer ranged but slower and more drop prone Wi-Fi option of today.
The GiFi uses the short-range wireless technology would potentially be a competitor or more than likely a replacement for Wi-Fi and things like Bluetooth might want to look out as well.
Mixing and signal filtering used in Gi-Fi technology would keep the signal strong versus the longer-ranged but slower and more drop-prone Wi-Fi option of today. The chip in Gi-fi would likely cost about $10 or less to build. This and a small design would allow cell phones and other small devices to add the technology without significantly drive up the price, according to the company. The change opens the possibility of a successor to UWB and its related technology Wireless USB, which matches the same range but roughly the same 480Mbps peak speed of its wired equivalent.

In recent years, new wireless local area networks (WLANs) such as Wi-Fi and wireless personal area networks (WPAN) such as Bluetooth have become available. Now we can compare the GI-FI technology with the existing technologies like Bluetooth, Wi-Fi.

Fig. High Speed Data Transmission Using Gi-Fi

Characteristic	Bluetooth	Wi-Fi	Gi-Fi
Frequency	2.4GHz	2.4 GHz	60 GHz
Range	10 m	100 m	10 m
Data transfer rate	800 Kbps	11 Mbps	5 Gbps
Power consumption	5mW	10mW	<2mW
Specification authority	Bluetooth SIG	IEEE, WECA	NICTA
Primary devices	Mobile phones, PDAs, Consumer, Electronics office Industrial Automation Devices Notebook,	Notebook, Computers, Desktop, Computer servers	Mobile phones, Home devices, PDAs, Consumer, Electronics office Industrial Automation Devices

Table:Comparison between Bluetooth, Wi-Fi, Gi-Fi.

IX. CONCLUSION

In this paper different wireless technologies is defined that will allow wireless transfer of audio and video data up to 5 gigabits per second, ten times the current maximum wireless transfer rate, at one-tenth of the cost, usually within a range of 10 meters that operates at 60GHz on the CMOS process. This technology removes cables that for many years curled the world and provides high speed data transfer rate. The comparison that is performed between Gi-Fi and existing wireless technologies in this paper shows that these features along with some other benefits such as Low-cost chip, No Frequency Interference, Low Power Consumption and High Security that are explained in detail in this paper, makes it suitable to replace the existing wireless technologies for data transmission between devices that are placed in the short distances from each other. Gi-Fi technology has much number of applications and can be used in many places and devices such as smart phones, wireless pan networks, media access control and mm-Wave video-signals transmission systems. Finally it is conspicuous that more research should be done in the field of this new wireless technology and its applications.

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An Intelligent Algorithm for Data Routing Over Peer To Peer Networks to Avoid Insecurity of Data and Eeicp (Energy Efficient Protocol for Wireless Sensor Network)

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***Abstract*- In this paper, we evaluate the performance of the AntNet routing algorithm in terms of efficiency and security in peer-to-peer networks. Using the network simulator NS2, a simulator is implemented for a network of 8-nodes which simulates the ant colony intelligence in deciding the most efficient and secured path from source to destination nodes. In the simulator, a variety of network scenarios is considered. The AntNet routing algorithm has the ability to detect faulty and malicious nodes and abandon them from the routing tables of the intermediate nodes. Hence, a healing is established so that packets are efficiently and securely transferred from source to destination. In addition, the probabilistic nature of AntNet routing distributes the network traffic of data packets over several optimal and suboptimal paths which lead to improve the network performance and minimize the packet latency.**

And an energy efficient inter cluster coordination protocol developed for the wireless sensor networks has been proposed. By controlling the topology, longevity and scalabity of the network can be increased. Clustering sensor node isan effective topology for the energy constrained networks. So cluster based algorithm has been developed in which different levels of clusters aare considerd on the basis of received signal strength to recognize the distance of clusters from the BS (base station) and to determine the number of cluster coordinator to make routes for the CHs to transmit the data.Based on the investigation of existing protocol in which cluster heads send data directly to the based station, it is found that direct transmission by the CHs is nit an optimal solution and dissipates a lot of energy, so in this a novel EEICCP(energy efficient inter cluster coordination)protocol has been proposed which evenly distributes the energy load among the sensor nodes and used the multihope approach for the CHs. For this algorithm, MATLAB is implemented.

1.INTRODUCTION:-

The P2P network comprises a collection of nodes that can cooperate and collaborate with each other to offer opportunities for real-time communication, collaboration and information sharing in a large-scale decentralized and distributed manner. A node in a P2P network can access information present in the network using peer discovery followed by a search and retrieval phase. The most distinct characteristic of P2P computing is that there is a symmetric communication between the peers; each peer has both a client and a server role. Both parties have the same capabilities and both can initiate a connection. It is the opposite of the client/server model in the sense that there is no central entity that the other parties contact but every single entity is able to initiate a connection directly with all other entities.

Routing in computer networks refers to the process of discovering, selecting, and employing paths from one node to another in the network. Routing involves two basic activities: determining optimal routing paths and transporting information packets through an inter-network. Routing protocols use metrics to evaluate what path will be the best for a packet to travel. Routing determines the overall performance of a network in terms of throughput and transmission delay. Routing process involves building forward tables, one for each node in the network, which tell incoming data which link to use to continue their travel towards the destination node [4]. While directing traffic from source to destination, the goal of the routing algorithm is to maximize the network performance and minimize costs.

A P2P system can take many forms . Email, Internet Relay Chat and Napster are all examples of P2P systems. Routing on these networks is either centralized or statically configured and is therefore unproblematic. Another class of P2P networks is the overlay network. Overlay networks build a virtual topology on top of the physical links of the network. Nodes leave and join this network dynamically and the average uptime of individual nodes is relatively low. The topology of an overlay network may change all the time. Once a route is established, there is no guarantee of the length of time that it will be valid. Routing in these networks is therefore very problematic.

Great interest was devoted to the routing problem and several routing algorithms were proposed. Static routing determines the path taken by a packet on the basis of the source and destination without regard to the current network state . This path is usually chosen as the shortest one according to some cost criterion. Adaptive routing, on the other hand, adapts the routing policy to the varying traffic conditions. Open shortest path first (OSPF) is one of the most widely used routing protocols. In OSPF, every node gathers information about the entire network and calculates the best path to each destination. For every destination, the interface to this path issaved in the routing table. While OSPF minimizes the static link cost, it cannot react to thedynamic nature of the network. While OSPF protocol is a static, deterministic algorithm, AntNet on the other hand introduces a dynamic, probabilistic approach. AntNet is a dynamic algorithm for packet routing in communication networks, originally proposed by M. Dorigo and G. Di Caro in 1997. In AntNet, a group of mobile agents (or artificial ants) build paths between pair of nodes; exploring the network concurrently and exchanging obtained information to update the routing tables.

In this discourse, we evaluate the performance of the AntNet routing algorithm in terms of efficiency and security in peer-to-peer networks. Using the network simulator NS2 , a simulator is implemented for a network of 8-nodes which simulates the ant colony intelligence in deciding the most efficient and secured path from source to destination. In the simulator, a variety of network scenarios is considered.

2.LITRATURE SURVEY

A. Crowds

Crowds are an anonymous network developed by Michael K. Reitter and Aviel D. Rubin. The degree of anonymity given by crowds can be ranged as probable innocence which defends against large number of attackers. This mechanism will defend against internal attackers and a corrupt receiver, but provides no anonymity against a global attacker or a local eavesdropper.

Crowds, was named for the notion *"blending into a crowd"*, which operates by grouping users into a large and geographically diverse group *"crowd"*, in which every user's intention is to hide their identity while communicating with some web server. The anonymity is achieved by hiding one's actions with the actions of many others while traversing one's message. In this way, crowds make it difficult for web servers to trace the original initiator of the message because, it is equally likely to have originated from any member of the crowd. Even the members in the crowd cannot distinguish the initiator of a message from those who are forwarding the requests . Crowds will try to provide sender's anonymity from all the nodes in the network along with the receiver.

On the other hand, it provides receiver anonymity only from adversaries and not from the sender. The other drawbacks of Crowds include, they failed to defend against denial-of-service attacks by rogue crowd members . Also, the anonymity of sender is exposed to local eavesdropper

B.Onion Routing

Onion routing is a technique developed by David Goldschlag, Michael Reed and Paul Syverson for anonymous communication over a network. This technique is developed based on David Chaum's mix networks . The main goal of this protocol is to protect the identity of an initiator and responder of a message and also the content of the message while it is traversing over the network. *Routing onions* is the core concept used by this protocol for anonymous communication. This concept deals with encoding routing information in a set of encrypted layers.

The anonymous communication between two nodes in this protocol happens in the following way :When an initiator wants to establish anonymous communication with a responder, he will approach application proxy. This will in turn forward this message to Onion proxy. Onion proxy will randomly select some routers and establish a route constructing an Onion. This Onion, is a recursively layered data structure that contains the information about the route to be followed over a network. These routers in *onion* are termed as core onion routers

The next step in this process is to forward this onion to entry funnel which is an entrance for routing in the network. Entry funnel will decrypt the first layer to see the information about next hop in the

route. This process continues until the onion reaches exit funnel. Exit funnel is responsible for traversing the packet to its destination. Onion Routing relies on Public KeyCryptography for anonymous Communication assuming that onion proxy will know public keys of all the routers in the network. Here, a router can only decrypt the corresponding layer with its private key.

The Routers can only know the information about the previous hop and next hop in the route. If an attacker compromises a node in the route, it can only get very little information keeping the anonymity of original source and destination. But, it is stated that onion routing will provide anonymity only from third parties and the nodes involved in the communication knows each other.

D.ANT ROUTING

P2P networks like Ants and MUTE, based on this routing algorithm, in a way to provide anonymity while sharing files among various peers in the network. The basic idea of this algorithm is inspired by the techniques of real ants in searching for food.

D.1 Route Discovery:

As the name states this phase helps in discovering various available routes between sender and receiver of a message. In a way to find a route to reach receiver, sender makes a random walk or a broadcast search that leads it towards the receiver.

D.2 Route Maintenance:

This phase helps in the improvement of routes between a sender and receiver. This algorithm doesn't need any special packets for route maintenance. It depends on the pheromone deposited by every message in their traversal to find the shortest path and for better maintenance of route. The pheromone here is the clue left by a message at every node in its traversal. This clue is nothing but a pseudo identity of sender/receiver. Based on these clues, a shortest path is selected.

D.3 Route Failure Handling:

This phase helps in handling the failed routes which is quite common in adhoc networks. The reason for route failures lies in the mobility of nodes in the network. This algorithm recognizes a route failure through a missing acknowledgement. If a node finds an error message, then it will first deactivate the link by setting the pheromone value to 0. The node then searches for an alternative link in its routing table. If it finds any alternative link, then it will traverse the message via, that link. Otherwise, a new route is created getting back to the initial phase.

3.PEER TO PEER NETWORK-

Defination:-

Peer-to-Peer systems are distributed systems consisting of interconnected nodes able to self-organize into network topologies with the purpose of sharing resources such as content, CPU cycles, storage and bandwidth, capable of adapting to failures and accommodating transient populations of nodes while maintaining acceptable connectivity and performance without requiring the intermediation or support of a global centralized server or authority.

In a peer-to-peer (P2P) network, every machine plays the role of client and server at the same time. Although a P2P network has a number of advantages over the traditional client- model in terms of efficiency and fault-tolerance, additional security threats can be introduced.

Peer-to-peer (P2P) is an alternative network model to that provided by traditional client-server architecture. P2P networks use a decentralized model in which each machine, referred to as a peer, functions as a client with its own layer of server functionality1. A peer plays the role of a client and a server at the same time. That is, the peer can initiate requests to other peers, and at the same time respond to incoming requests from otherpeers on the network. It differs from the traditional client-server model where a client can only send requests to a server and then wait for the server's response.

4. NETWORK ROUTING:-

Packets are to be routed from source to destination .Such packets we need transverse many cross-points similar to traffic intersection in a road transportation network cross-points in the Internet are known as routers. A router's function are to read the destination address marked in an incoming IP packet to consult its internal information to identify on outgoing link to which the packets is to be forwarded to the packets ..

Suppose that traffic suddenly increase , for an example , because of many users trying to download from the same website ,then packets are generated can possibly be queued at routers or even dropped .Since a

router maintains a finite amount of space known as buffer , to temporarily stored backlogged packets , it is possible to reach the buffer limit . Since the basic principle of TCP/IP allow the possibility of IP packet not being delivered or being dropped enrout , the finite buffer at a router is not a problem . On the other hand , from the efficient delivery point of view ,it is desirable not to have any packets loss (or at least minimize it) during transit. This is because there liable delivery notion works on the principle of retransmission and acknowledgement and any dropped would mean an increase in delay due to the need of retransmission ..

Thus for efficient delivery of packet there are several key factors to consider routers with a reasonable amount buffer space link with adequate bandwidth actual transmission with minimal error (to minimized packet being garbled), & the router's efficiency in switching a packet to the appropriate outgoing link.

5. ANTNET BASED ALGORITHM:-

A.The Ant Colony Optimization

In ant colony, ants are able to find the shortest path between a food source and their home colony . Real ants communicate via pheromones. The ant deposits a certain amount of pheromone when it walks. An ant tends to choose a path positively correlated to the pheromone intensity of found trials. The pheromone trail evaporates over time . If many ants choose a certain path and lay down pheromones, the intensity of the trail increases. Thus, this trail attracts more and more ants; a process that results in ant highway following the shortest pat. Ants also have the ability to adapt to the environmental changes, for example, finding the new and shortest path once the old one is no longer feasible due to a new obstacle.

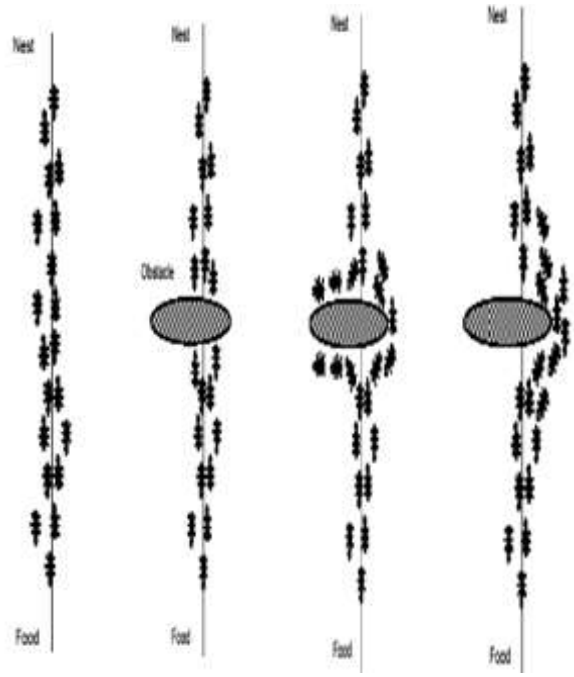


Fig.ACO

Ant colony optimization ACO mimics in software the behavior of real ants in colony. In applying ACO in network routing, an artificial ant is typically realized as a simple program consisting of simple procedures that simulate the laying and sensing of pheromone, and data structures that record trip times and the nodes that it passes . Moving from one node to another, an artificial ant emulates laying of pheromone by updating the corresponding entry in the routing table in a node which records, for example, the number of ants that pass that node. In ant colony based algorithms, a set of artificial ants move on the graph which represents the instance of the network.

While moving they build solutions and modify the problem representation by adding collected information. The most important application of ACO is network routing as it is desired to transfer data packets from a source to a destination in an efficient way

B.The AntNet Routing

Unlike traditional routing algorithms such as OSPF, AntNet dropped the deterministic way of routing and introduces a probabilistic approach. An overview of the entire network is no longer needed. The link state database of AntNet is smaller than the database of OSPF as an AntNet node only needs to keep information about the links between itself and the adjacent node, and. all the nodes in the network.

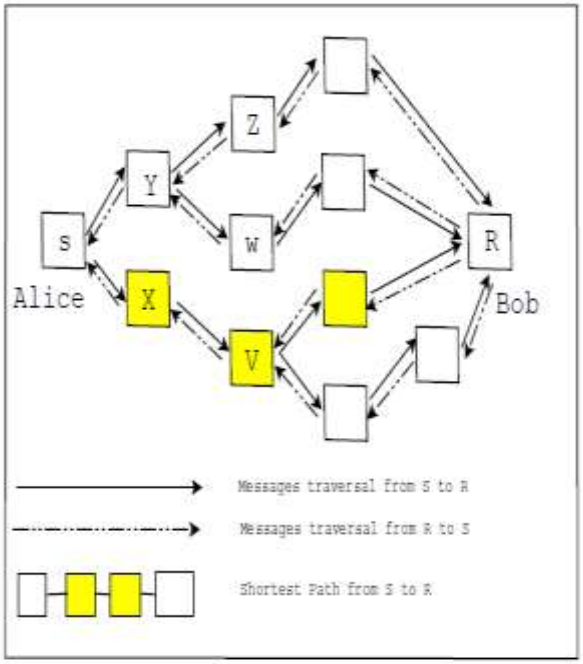
Routing decisions are based on the basis of local and approximate information about the current and the future network states.

Each artificial ant builds a path from its source to its destination node. While building the path, it collects explicit information about the time length of the path components and implicit information about the load status of the network . This information is then back propagated by another ant moving in the opposite direction and is used to modify the routing tables of the visited nodes. AntNet system comprises two sets of homogeneous mobile agents called *forward* and *backward* ants .

They possess the same structure but they can sense different inputs and they can produce different independent outputs. *Forward* ants gather information. On a regular time base, every node sends one forward ant with a random destination over the network.

This forward ant is forward by some intermediate nodes to its final destination, in a way that balances between exploitation of known good paths and the exploration of new, possibly better paths. *Backward* ants are created out of forward ants once they have reached their destination. The backward ant follows exactly the same path as the forward ant but in the opposite direction resulting in adapting the probabilities in the routing table of all intermediate nodes.

Fig. ANTNET ROUTING



C. 1)ANTNET ALGORITHM

Algorithm AntNet1.0

Suppose a data network, with **N** nodes, where *s* denotes a generic source node, when it generates an agent or ant toward a destination *d*. Two types of ants are defined:

1. Forward Ant, denoted *Fs d*, which will travel from the source node *s* to adestination *d*.
2. Backward Ant, denoted *Bs d*, that will be generated by a forward ant *Fs d* in thedestination *d*, and it will come back to *s* following the same path traversed by *Fs d*,with the purpose of using the information already picked up by *Fs d* in order to update routing tables of the visited nodes. Every ant transports a stack *Ssd*(*k*) of data, where the *k* index refers to the *k*-est visited node, in a journey, where *Ssd*(0)= *s* and *Ssd* (*m*)= *d*, being *m* the amount of jumps performed by *Fs d* for arriving to *d*.Let *k* be any network node; its routing table will have N entries, one for each possibledestination.Let *j* be one entry of *k*

routing table (a possible destination). Let *Nk* be set of neighboring nodes of node *k*.Let *Pji* be the probability with which an ant or data packet in *k*, jumps to a node *i*, *i* _ *Nk*, when the destination is *j* (*j*_*k*). Then, for each of the N entries in the node *k* routing table, it will be *nk* values of *Pji* subject to the condition: *Pji i*_*N*å_1 ; *j*=1,...,**N** . (**1**)
The following lines show AntNet1.0 pseudocode, using the symbols and nomenclature already presented: Argentine Symposium on Artificial Intelligence

BEGIN
{ Routing Tables Set-Up: For each node *k* the routing tables are initialized with a
uniform distribution:
Pji nk1, _i_Nk . (2)
DO always (in parallel)
{
STEP 1: In regular time intervals, each node *s* launches an *Fs*

_
d ant to a
randomly chosen destination *d*.
/*During its trip to *d*, when *Fs*

_
d reach a node *k*, (*k*

_
d), it does step 2*/
DO (in parallel, for each *Fs*

_
d
{ STEP 2: *Fs*

_
d pushes in its *stack Ss*

_
d(*k*) the node *k* identifier and the
time elapsed between its launching from *s* to its arriving to *k*.
Fs

_
d selects the next node to visit in two possible ways:
(a) It draws between *i* nodes, *i*

_
Nk, where each node *i* has a *Pdi*
probability (in the *k* routing table) to be selected.
IF the node selected in (a) was already visited
(b) It draws again, but with the same probability for all
neighbor nodes *i*, *i*

_
Nk. Fs

_
d jumps to chosen node.
IF the selected node was already visited
STEP 3: A cycle is detected and *Fs*

_
d pops from its
stack all data related to the cycle nodes, since the
optimal path must not have any cycle. *Fs*-*d* comes
back to step 2 (a).
END IF
END IF
}WHILE jumping node_*d*
STEP 4: *Fs_d* generates another ant, called backward ant *Bs_d*.
Fs_d
transfers to *Bs_d* its *stack Ss_d* and then dies.
/**Bs_d*, will follow the same path used by *Fs_d*, but in the opposing
direction, that is, from *d* to *s**/
DO (in parallel, for each *Bs_d* ant)
{
/*When *Bs_d* arrives from a node *f*, *f_Nk* to a *k*, it does step 5*/
STEP 5: *B*-*d* updates the *k* routing table and list of trips, for theentries regarding to nodes *k*' between *k* and *d* inclusive, according to
the data carried in *Ss_d* (*k*').
IF *k_sBs_d* will jump from *k* to a node with identifier given by *Ss_d* (*k*-1)
END IF
}
WHILE (*k_s*)
}

}
END

C.2 EEICCP ALGORITHM:-

Algorithm of EEICCP protocol works in this way , that after the data transmission by all the nodes of all the clusters , one round gets complete and election phase restart. The cluster heads are elected on the basis of the number of the clusters. As 1055 nodes are taken in simulation newly protocol, deviding the 1000 nodes into 10 clusters of 100 nodes each. As there are layers of clusters one above the other so the formula of sum of first n natural numbers (_n(n+1)/2) is used to calculate CHs needed for the 10 clusters(n) and they are in increasing the sequence sterting from the depth first which has only 1 CH (with highest distance from the BS) and they are in the order of (1,2,..10) as movement is accomplished from depth to the BS , so clusters nearest to the BS has 10 CHs. In each cluster out of all the CHs in that cluster one is the CH for the nodes of that cluster and other acting as the CCOs(cluster coordination) for the clusters.

Election phase :-

$Ech\_elec=l(Ee+Es.d^2) + n1.l(Ee + Ebf)$

Algorithm for data transmission

1.set k=0, n=1
2. set j= no. of cluster-k
3. Repeat while j≥1
4. If j!=1 then
Cluster[j-1][n+1]=cluster[j][n]
[increment] set n=n+1
Else
Base_station = cluster[j][n]
[increment]k=k+1
Set n=1
End of if structure
5. [decrement] set j=j-1
Go to step 2
6.End of step 3 loop
7.Exit

6 . CONCLUSION

In this paper, the performance of AntNet routing algorithm is evaluated through simulation using NS-2 Simulation package. A variety of network scenarios with 8 nodes is considered. The protocol is proved to be robust in the sense that faulty nodes are detected and bypassed. The broken links are abandoned from the routing tables and a healing is established so that packets are routed from their sources to destinations. In addition, the AntNet algorithm is securable so that malicious nodes are ruled out to avoid leakage of transmitted information. The probabilistic nature of AntNet routing distributes the stream of data packets over several optimal and suboptimal paths which improves the network performance and minimize packet latency

EEICCP:- The new multihope clustering best routing protocol EEICCP has been described, which minimizes the usage and further increases the network lifetime by uniform distributing load of energy among all the sensor nodes. EEICCP out performs conventional protocols that send data directly to the base station through their respective CHs. Dividing in the network into layers of clusters has been proved to be a good approach in reducing the energy to great extent. Each node has the equal responsibility of receiving data from all other nodes in the cluster and to transmit the aggregating signal to the base station.

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